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CONTENTS

	PAGE
Naval Aviation and a United Air Service.—Craven	307
Leadership.—Parker	323
New Wine in Old Bottles.—Taylor	331
Some Sound Phenomena Connected with Gun-Fire.—Schuyler	345
The Soul of the Service.—Jessop	351
A Practical Test of Radio Compass Shore Stations.—Hunter	363
The Twelfth Regiment (Public Works) at Great Lakes.—Allen	367
The Origin of Grog.—Thorpe	377
The Mystery of the Line of Bearing.—Burrage	379
Discussion	393
Secretary's Notes	397
Annual Financial Statement	399
Professional Notes	405
Notes on International Affairs	447
Review of Books	457
Information Index	398

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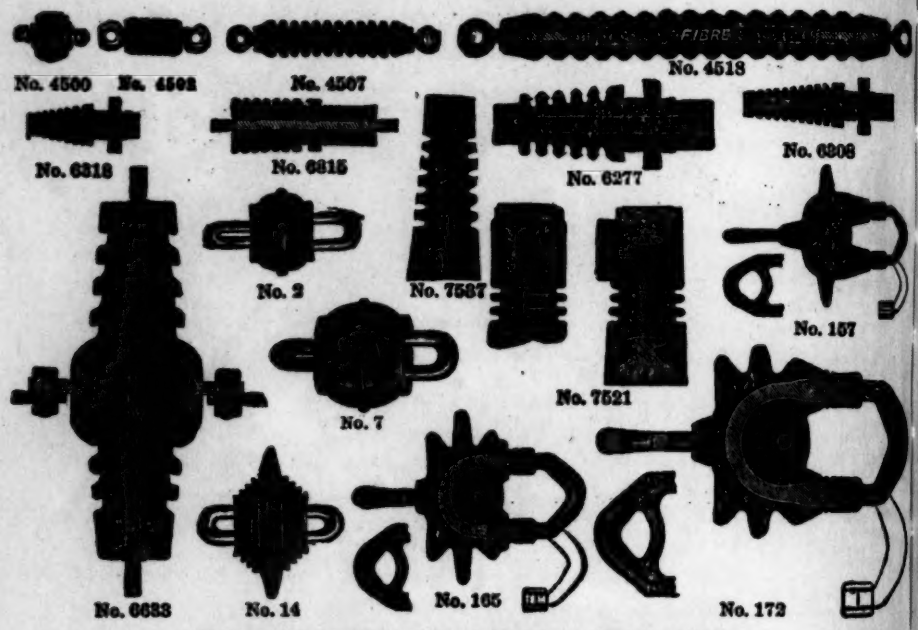

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CONTENTS

NAVAL AVIATION AND A UNITED AIR SERVICE. By Captain T. T. Craven, U. S. Navy 307

LEADERSHIP. By Commander R. C. Parker, U. S. Navy 323

NEW WINE IN OLD BOTTLES. By Captain J. S. Taylor (M. C.), U. S. Navy 331

SOME SOUND PHENOMENA CONNECTED WITH GUN-FIRE. By Commander Garrett L. Schuyler, U. S. Navy 345

THE SOUL OF THE SERVICE. By Captain E. P. Jessop, U. S. Navy 351

A PRACTICAL TEST OF RADIO COMPASS SHORE STATIONS. By Lieutenant Harold O'D. Hunter, U. S. Navy 363

THE TWELFTH REGIMENT (PUBLIC WORKS) AT GREAT LAKES. By Commander Walter H. Allen (C. E. C.), U. S. Navy 367

THE ORIGIN OF GROG. By Colonel G. C. Thorpe, U. S. M. C. 377

THE MYSTERY OF THE LINE OF BEARING. By Rear Admiral G. H. Burrage, U. S. Navy 379

DISCUSSION 393

SECRETARY'S NOTES 397

ANNUAL FINANCIAL STATEMENT 399

PROFESSIONAL NOTES 405

NOTES ON INTERNATIONAL AFFAIRS 447

REVIEW OF BOOKS 457

INFORMATION INDEX 398

NOTICE

ANNAPOLIS, MD., February 14, 1921.

The Board of Control, having carefully read the essays published in the PROCEEDINGS during the year 1920, have the honor to announce that, in accordance with Article XI of the Constitution, the prize for the year 1921 is awarded to the essay "Accuracy of Fire at Long Ranges," by Captain J. V. Chase, U. S. N.

Honorable Mention is accorded to the following essays:

"A Description of the Battle of Jutland," by Lieut. Commander H. H. Frost, U. S. N.

"Possibilities of a Trans-Pacific Flight," by Commander G. C. Westervelt (C. C.), U. S. N., and H. B. Sanford.

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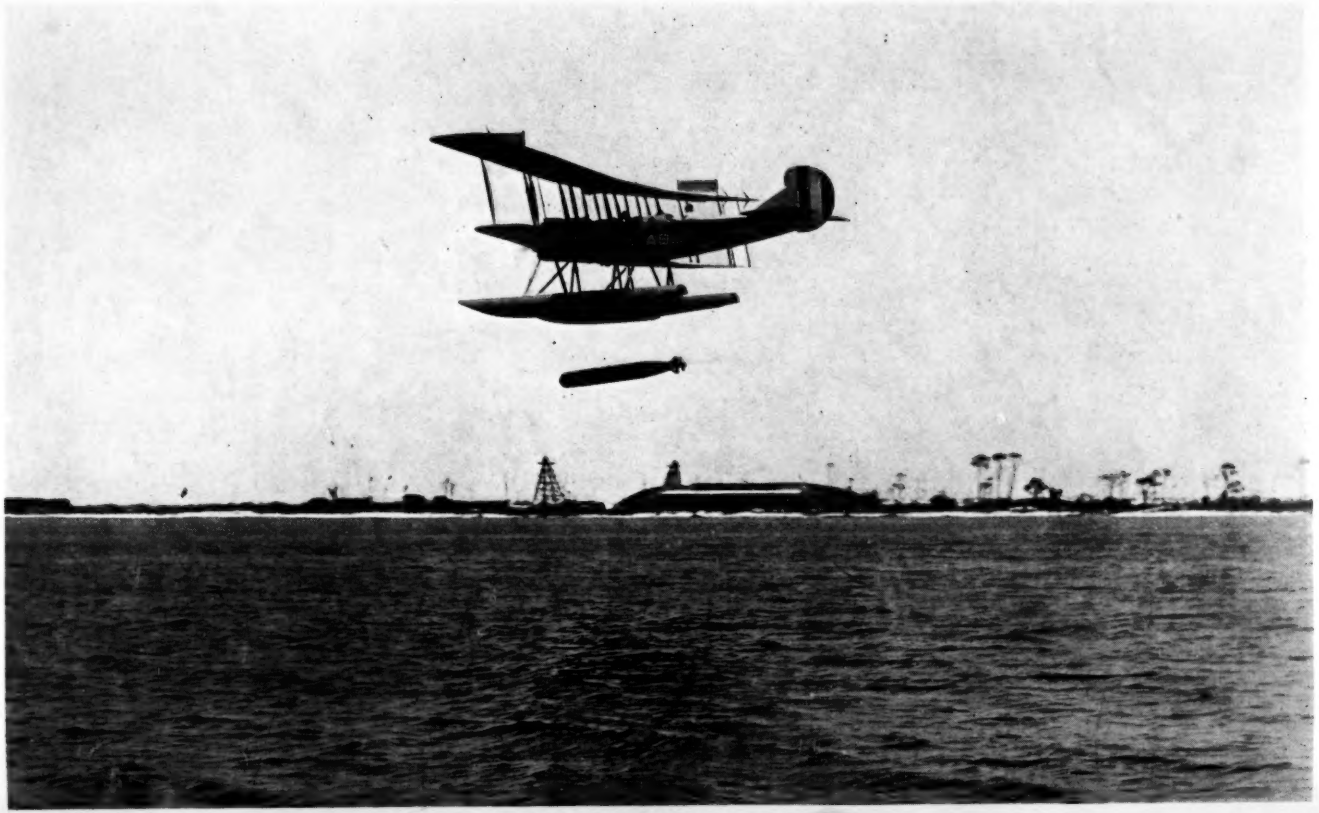

NAVAL SEAPLANE DROPPING TORPEDO.

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NAVAL SEAPLANE DROPPING TORPEDO.

NAVAL AVIATION AND A UNITED AIR SERVICE

By CAPTAIN T. T. CRAVEN, U. S. Navy

The prime factor in the problem of lessening the likelihood of wars is the democratization of governments, assisted through improvement in communications and transportation, and the community of world-wide commercial and industrial interests. Allied with this important factor is another dealing with the terrific expense of modern warfare and the serious interference with business incidental to the mobilization of national resources. A third deterrent is the augmented frightfulness of conflict and the stupendous physical damages wrought through the application of modern arms.

The important influence of each of these factors is well understood, and though to-day we find man willing to admit that wars are to be less frequent in the future than has been the case in the past, statesmen retain the view that the likelihood of resort to arms remains of more than mere contingent interest.

If the recurrence of war is conceded as a possibility, protection of the persons and of the interests of citizens remains a most important and also unavoidable public business of a commonwealth. All world powers retain disinclination to jeopardize national safety while anxiously considering the possibilities of reduction of armament and diligently seeking a means for diminishing the expenses of insurance against the ravages of invasion, for those who have

had experience in battle are in accord that future conflicts will be far more destructive to life and to property than any which have taken place in the past.

In our study of the subject of national defense, we will find it clearly set forth that countries with far-flung overseas possessions and wide commercial interests have never rested secure behind immobile coastal fortifications, and that now, far easier than ever before, business paralysis and national bankruptcy may be precipitated by agents never sighted from the shores of the state assailed. Historically it can be shown that, when outlying territory and the overseas commerce of a nation have not been afforded adequate naval protection, such interests in time have passed automatically into the hands of other countries better appreciating the value of naval power.

While it is entirely reasonable to presume that through the continued progress of science our present ideas of sea warfare and of sea strategy may be completely revolutionized, and that ultimately the influences of aeronautics upon the destiny of nations may become far-reaching, there is no replacement at present for sea power, which continues to supply the sole means for protecting outlying possessions and for ensuring the security of waterborne trade. Questions as to types of vessels and of arms best adapted for naval purposes and concerning the tactical employment of ships have supplied topics for discussion for hundreds of years, but from the earliest times, large, powerful units have constituted the backbone of naval strength, and as yet no substitute has appeared for the capital ship, the infantry of the sea, as the nucleus around which to construct the fleet. It is short-sighted, however, to base ideas of a naval war upon conceptions of what may be but a single and a remote phase of the conflict, such as a classic fleet engagement between battleships, without proper consideration of the tedious though important operations of maintaining forces in the theaters of activity, efforts which, perhaps, have led up to the conflict between the major units or had an exceedingly important bearing upon the issues of the campaign. The variety and numbers of fighting units necessary are dependent upon the strength of the enemy, the composition of his forces, and the circumstances in which the antagonists are placed.

To measure the power of a navy by the strength of its battleships alone is heresy. Furthermore, the investment of the thirty

odd million dollars necessary for the commissioning of a single battle unit is an insurance proposition which does not to-day appeal particularly to the tax-payers anywhere in the world. Everywhere the desire exists to find a substitute for huge and expensive naval hulls which are far too valuable to risk upon the coasts of the enemy, and all seek the means to augment the effectiveness of naval force through other agents.

Generally speaking, naval force must have eyes to discover the foe; tentacles capable of searching out and cutting arteries of communication, of crushing his outer members, of holding him, and of applying the pressure that assists in the strangulation of his main body. Battle cruisers, light cruisers, destroyer leaders, destroyers, submarines, mine layers, aircraft carriers, and aircraft are indispensable. They are the arms and the eyes of the fleet and are just as requisite for the conduct of operations afloat as are artillery, tanks, chemical warfare service, aircraft, and other auxiliaries as assistants to the infantry arm in present-day land warfare.

Bases near the scene of conflict are requisite. Such positions furnish indispensable links in the chain of naval defenses which must be suspended from these centers. Assailing an aggressive adversary scientifically prepared for war, without having bases from which to project one's effort, would court disaster. It should be borne in mind, however, that though the present has given stupendous force to the great variety of military arms, mere position, without mobility and the power to act aggressively, is almost valueless. A base does not constitute strength, it simply affords a point from which strength may be applied. Unless offensive acts which seriously affect the enemy can be projected from a base, and it is used to further these operations, such a point may become a serious source of anxiety instead of an asset to the home land in the event of war.

Aviation is now a powerful supplement to sea power, through which the might of the mobile naval arm may be greatly increased. This supplement is potent in that it furnishes a means for obtaining information, now a detail of supreme importance, and it is also an agent for applying violence to the territory of the foe. A fleet no longer may withdraw from the seas and safely await its opportunity to strike, for aviation nullifies the security formerly supplied by sheltering harbors protected by coastal forti-

fications in which the side choosing the defensive could formerly seek refuge. Aviation vastly augments the difficulties and the hazards of conducting naval operations upon the coast of an enemy supplied with an aeronautical arm. Consequently, it is a strong weapon of naval defense as well as of offense.

The adaptation of aviation to naval work along these lines was begun during the first years of the recent struggle, but did not, by any means, reach the advanced stage attained by military aeronautics, and the suppression of the submarine has been considered as the major effort of the naval sky-men during the World's War. In the historical narratives now appearing, we see the importance which the naval leaders attached to the control of the air, and from these articles we are beginning to get direct evidence of other important results accomplished by naval aeronautics. From them also we glean opinions based on proved experience concerning the organization of the naval aviation arm, and the way in which it may be applied. It has been clearly demonstrated that aviation is an indispensable adjunct to the navy, but in our research we will discover that, while past achievements are wonderfully suggestive as to the possibilities of the future, there remains a tremendous field yet open for development and experimentation in flying operations over water. Indeed, one may say that even the type of machines best adapted for distant overseas work from ships as bases remains undecided, and that the naval flier is still basing his tactical plans upon the perfect performance of apparatus as yet undesigned. It is probable that this condition will continue to obtain for some time, and the best that can be done immediately is to provide the means permitting the widest investigation and experimentation in the development of naval flying equipment and accessories. It is needless to state that it is important to attack the uncertainties of experimentation and design directly. Those responsible for carrying on tactical operations alone can judge of military requirements rightly, and the designer must work closely and progressively with the operator, and, in order to be able to supply his demands, be familiar with the peculiar conditions in which the latter is employed.

The sailor has always had a technique of his own which, to the landsman, has been somewhat of a mystery oftentimes engulfed in sea sickness, and the navy alone is competent to work out a solution to the problem now in hand. The situation, however, is

complicated because of the wide exercise of imagination on the part of many individuals who, keenly interested in flying and familiar with the performance of aviation over land, display ignorance of the sea and of naval requirements. Frequently items are printed regarding aviation which carry naval construction and naval engineering far beyond the development of the arts as they may be practiced at the present time.

Publicity is the most powerful lever man has at his disposal for directing progress. Sustaining the interest of the public by means of publicity is essential, but care should be taken that statements set forth should not be exaggerated. Exaggerated statements that may momentarily strongly appeal to the popular imagination have really little lasting influence, and are not soundly beneficial. Extravagant claims unfulfilled always breed public distrust.

There has been much discussion in the press concerning the basic organization for naval aeronautics, of grave importance to those concerned with that arm and to the people who have regard for public interests, for upon this vital point depends the speed, the economy, and the efficiency of future progress.

During the recent war with an actively aggressive enemy within easy flying range, the air forces of Great Britain were merged into a single organization, and British naval aviation, as such, disappeared. The amalgamation, devised to relieve a peculiar situation, was advocated by the strong army flying corps whose existing organization would be only slightly disturbed by joining the forces. It was endorsed by the press and by politicians, and was effected despite the objections of the naval contingent. At the time, it seemed to those who were interested particularly in the naval aspect, that coordination became difficult, and that an indiscretion had been committed, though it was imperative to meet directly the conditions that the enemy had imposed upon England and her allies. The opinion of opponents of the measure was based on the idea that circumstances might well be entirely different in future conflicts, particularly where adversaries were far distant from one another, and that it must seem evident that anything that might diminish the coordinated flexibility of organization, and the mobility so essential for the far-reaching naval machine, was fundamentally undesirable.

For a nation the home territory of which is not immediately exposed to dangers of invasion but nevertheless having wide-flung national interests at stake, the issue is of peculiar importance, and it is of particular interest now for us again to view the situation in Great Britain, as suggestion has been made that we organize our defenses along British lines.

An important historical lesson which cannot fail to impress itself upon the minds of all students is the effect of tradition and of service ties upon service thought. In reading, one notes the many failures of amphibious enterprises, undertaken jointly by troops and sailors, due directly to mutual misunderstandings. One cannot fail to observe how frequently a sacrifice of public interest has been made at the altar of personal prestige. Despite the difficulty of coordinating the work and interest of the army and the navy, and though the importance of concentrating human effort, and of eliminating confusion in the conduct of present-day warlike operations is vastly enhanced by the speed with which tremendous force may be exerted, England has assumed the task of coordinating three separate arms.

The Air Service and the British Fleet are together working for the solution of the problems made common to both, and the presence of airplane carriers, special ships arranged particularly for the conveyance of aircraft, has facilitated this task. We know that every effort is being made to ensure harmony in the work of the two organizations embarked in a single ship; nevertheless, rumor has it that all is not plain sailing, and it is evident that the old problem of overcoming human friction continues to be the one giving gravest concern. It remains to be seen how satisfactorily the arrangements advocated by the Admiralty will work out.

The following extract from the statement of the First Lord, explanatory of the Navy Estimates, 1920-1921, indicates the present opinion of British naval authorities:

> So far as can be foreseen, naval requirements will be met by the proposal ultimately to form a naval wing under the Air Ministry, with a personnel specially trained for naval work.
>
> To assist in the development of this naval wing, it is proposed to detail officers volunteering for air work to the Air Service for training and for subsequent service in the naval wing. Such officers as are specially fitted for work in the higher ranks of the Air Service will, by arrangement with

the Air Ministry, be permitted to continue in the Air Force, but the majority of officers after their term of service in the Air Force will return to the Naval Service and continue their naval duties. Thus in the course of a few years there will be a body of naval officers who will have had experience in the Air Service, who will be equipped with knowledge regarding air matters, and who will be able to keep the navy as a whole fully up to date in regard to air strategy and air tactics in relation to sea power.

This would seem to be a compromise essential and desirable in view of the principles underlying the organization of the Royal Air Force.

Wide complications have been introduced because through the medium of the air, military and naval forces to-day are brought into much closer contact than ever before, and at times their operations must overlap. In coastal operations particularly there is possibility of misunderstanding which may lead to inadvertence in a national emergency.

In the effort to avoid conflict of authority and confusion in matters of coast defense, the Admiralty have represented to the Air Council that in their opinion:

(a) The operations of all aircraft flown from H. M. ships and vessels with whatever object in view, that is to say, not only reconnaissance and artillery observation machines, but also machines which are carrying out operations in the air for offensive and defensive purposes; and

(b) All operations carried out by aircraft not flown from ships, but which are being carried out in connection with the command of the sea, that is to say, operations for oversea reconnaissance and for the attack of enemy ships and vessels—

should be under naval control. Dual control would be unworkable. In all matters relating to the command of the sea the Admiralty are and remain the responsible authority.

The propriety of these arrangements must be evident to those who concede to the navy domination in overseas activities.

When the day comes, and perhaps it may, that supremacy in the air controls, then all air forces should and must be united. For the present the strongest argument that may be advanced in favor of a united air service is that such an organization centralizes authority and ensures for aviation strong backing and support, without which progress may be slow in the development of the art now that the artificial stimulation incident to war has been removed. An allied argument is that though such a plan would take away from the army and the navy the aeronautical branches rightly belonging to them, in the past, the army and the navy have

been loath to accept aeronautics. In considering the broad question as to the advisability of a combined air force, too much stress cannot be laid upon the conviction that while perhaps those who are or have been interested in the army aeronautical branch may consider the occasion timely for an amalgamation, the navy holds a contrary opinion, which is shared by our highest military authorities. Vast experience in practically every phase of army aeronautics has been obtained, and the value of the land reconnaissance machine, scout, fighter, and bomber clearly demonstrated under war conditions. Desperate competition for air supremacy on the Western front in Europe was responsible for the rapid development of army aviation, but no such field of activity was open to naval aviation, and little real war experience was obtained with fleet spotting and reconnaissance machines, torpedo planes, or aircraft operating with the fleet and flown from the decks of ships.

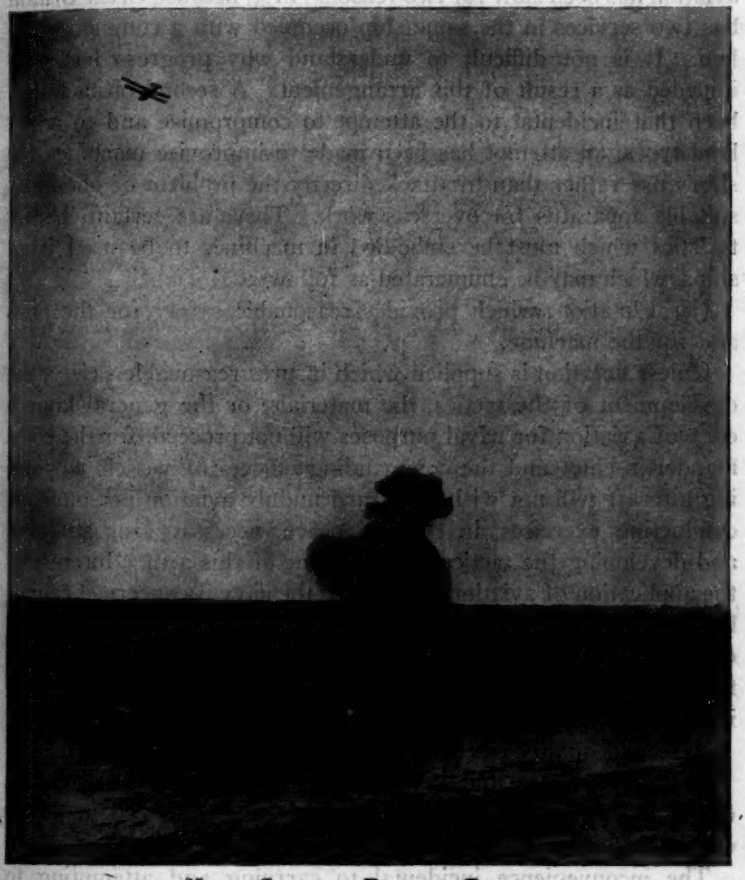
The landsman cannot appreciate the difficulties confronting the sailor in the application of his arms, or the fact that in using weapons the sailor has a task entirely different from that given his brother on shore. The failure to understand this fundamental is to a considerable degree responsible for the views which we hear expressed frequently with regard to the desirability of a United Air Service. It is not appreciated possibly that a flier accustomed to work with the army and over the land, unfamiliar with the tactical employment of ships and with the sea, would be of as little assistance in carrying on naval work as would be a soldier, untrained in naval matters, on board a surface or subsurface vessel in time of action.

A gun installed on land, on a steady platform, which does not move, which cannot sink, and which may be concealed and strongly protected, is far simpler to operate effectively than is a similar weapon conveyed in a ship. According to an old French saying, "One gun on the land is worth ten guns on the sea." The problem of ordnance and of gunnery, as it is presented to the two services, to some degree exemplifies many other difficulties inherently belonging respectively to the army and to the navy.

The assailing of land bases by the navy has always been fraught with many complications. Such is destined forever to remain the case. Every weapon which the navy can use in such operations can be better employed by its opponents from the shore. This

will be true of the flying sailor in the future as it has been true in the past of mariners who did not fly.

The aviation service which the navy desires now, and which it must have, is an arm which will assist it to defeat the enemy



NAVAL SEAPLANE DROPPING BOMBS.

at sea. This is its paramount present-day essential. In so far as this detail is concerned, and regardless of future developments, the matter is purely a naval one which the navy alone can handle.

The development of the land plane and of aviation tactics over the land in conjunction with troops has progressed far beyond the uncertain stage of experimentation. In the combined service

which has been developed in England, the preponderance of experience, of skill and technical talent, and of numbers, rests with the branch composed of those who have won their laurels in connection with overland operations. The development of naval aviation has been slow for two reasons: first, because Great Britain has two services in the same ship occupied with a common problem. It is not difficult to understand why progress has been impeded as a result of this arrangement. A second obstacle has been that incidental to the attempt to compromise and to adapt land types, an attempt has been made to improvise machines for ship's use rather than to attack directly the problem of obtaining suitable apparatus for overseas work. There are certain characteristics which must be embodied in machines to be used from ships, which may be enumerated as follows:

(a) Flotation, which provides reasonable safety for the pilot and for the machine.

Unless flotation is supplied which insures reasonable safety, the development of the tactics, the materials, or the general knowledge of aviation for naval purposes will not proceed, for the commander-in-chief and the commanding officers of vessels employing aircraft will not wish to hazard unduly aviation personnel in conducting exercises, in time of peace, necessary for studying and developing the tactical employment of this arm. Interest in the application of aviation in so far as the navy is concerned cannot be obtained unless this characteristic is given to naval plans. An effort to compromise the land type of plane by fitting it with flotation for work over water is a valuable experiment but so far it has been insufficient for naval requirements.

A second quality essential for naval planes is:

(b) Ruggedness and dependability, capable of being taken down and assembled easily and quickly and when taken down, capable of compact stowage.

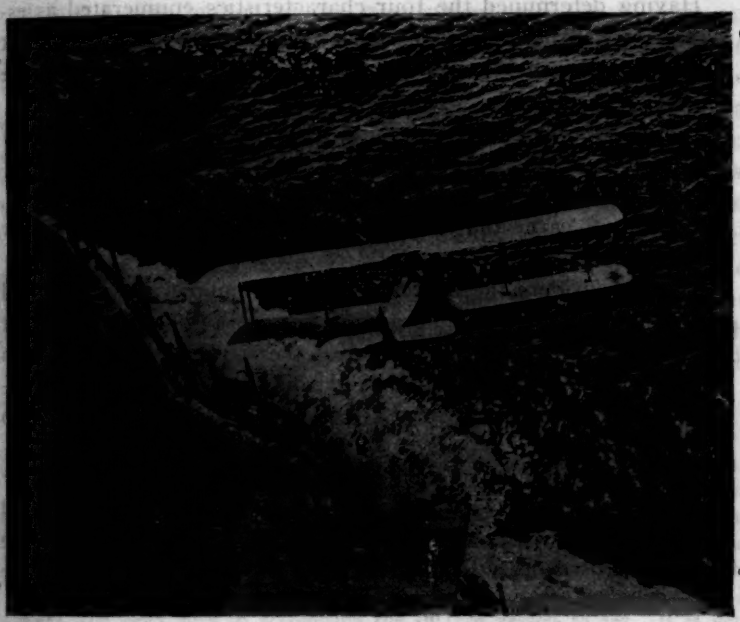
The inconvenience incidental to carrying and attempting to operate planes from the decks or turrets of ships adds one more mental burden to the great load already carried in times of peace by the captain of a naval unit. The present types of planes when conveyed on decks or turrets are very much in the way and one cannot expect to find airplanes in general use on shipboard until machines have appeared which can be taken down easily and stowed inboard out of the weather and in a fashion which does

not interfere with ship activities. Features which embody ruggedness and permit the quick taking down and assembly of planes are of far greater importance to the navy than to the army.

A third attribute to be incorporated in a naval plane is:

(c) Ability to fly from a vessel, either directly or assisted, and to land on the deck of a ship or in the water.

In order that planes may be carried in different types of vessel, it is essential that they may get away from the deck of the ship



NAVAL AIRPLANE FLYING FROM A SHIP AT SEA.

with a very short run or that they may be projected into the air from a machine such as a catapult. It is self-evident that a naval plane must be fitted to land on a deck or on the water. The land flier is not concerned with these details.

A fourth essential attribute for a naval plane for ship's use is:

(d) Low landing speed.

It can be readily seen that the closer the speed of the plane approaches the speed of the plane carrier—the ship upon which she desires to land—the easier a landing becomes upon the deck of such a vessel. A plane with an excessively high landing speed

cannot land upon the deck of a carrier with any degree of safety. The importance of low landing speed is supreme for planes to be conveyed in ships of the carrier type.

It is evident that these four characteristics cannot be secured without sacrifice, to some degree, of the high performances now given to the plane of purely a land type, but the navy must accept this penalty in the aviation arm as it does in the application of all weapons conveyed in surface and subsurface vessels.

Having determined the four characteristics enumerated as essentials, we then have a fifth which must be included in order that the machine carried by a ship may serve a useful end. The plane must be:

(e) Capable of conveying and of usefully applying military power.

This implies good vision, maneuverability, speed, and climb, also ability to carry and to utilize an armament of guns, bombs, or torpedoes.

If one considers the five characteristics enumerated above and has knowledge of the conditions of the art as it exists to-day, it becomes evident that the solution of the naval problem has been retarded by the processes of standardization, that have inadvertently developed in the past, of types of planes for the two services.

The proposition to combine the production of machines for the army and the navy therefore is seen to be illogical and could only result in further delaying the naval unit in its effort to acquire the apparatus which will permit aviation definitely to take the place belonging to it in naval affairs.

In all scientific research, centralization is fatal, and in chemistry, biology, and physics, the advancement of human knowledge has come from the independent and competitive efforts of men scattered all over the world, yet working on the same problem. In this way, false deductions are disproved and useful suggestions are carried further and confirmed. In aviation, experimentation and development, if centralized, would in the course of time become controlled by the strongest influence in the central organization, which would produce a series of official designs incorporating the virtues and prejudices of the bureaucracy. The highly developed automobile has come directly from the competitive efforts of countless minds engaged in scientifically investigating

and solving the many problems involved in its production. The aviation art is comparable to the automobile industry in the transition stage and requires the widest investigation and development.

Military and naval aviation are for the grim but definite purpose of waging war. Civil aviation has an entirely different end. To military, naval, and civil aviation are presented concrete and entirely different problems, each susceptible of independent solution. The creation of an independent and united service, necessitating a new branch of the government carrying a great and uneconomical overhead, does not supply an organization fitted for the work now in hand. With the establishment of a means through which development of military and naval aeronautics may be insured directly through agencies belonging to these services, and civil interests cared for and promoted by other methods, all good reasons for the building up of a united air service disappear.

A sailor must be skeptical as to the success of ventures undertaken far from home bases by a united air service or by other services where naval interests are paramount but control divided. That doubts exist in England with regard to the success of the British plan is evident from the statement made by Admiral Jellicoe in his book, "The Crisis of the Naval War."

On page 256 of that publication we read the following:

> In the matter of organization we must be certain that adequate means are taken to ensure that the different arms which must cooperate in war are trained to work together under peace conditions. A modern fleet consists of different types—battleships, battle-cruisers, light cruisers, destroyers and submarines. Before I relinquished the command of the Grand Fleet, large sea-going submarines of high speed, vessels of the *K* class, had been built to accompany the surface vessels to sea. It is very essential that senior officers should have every opportunity of studying tactical schemes in which various classes of ships and kinds of weapons are employed. In considering the future of the navy it is impossible to ignore aircraft. There are many important problems which the navy and the air service ought to work out together. A fleet without aircraft will be a fleet without eyes, and aircraft will, moreover, be necessary, not only for reconnaissance work, but for gun-spotting, as well as, possibly, for submarine hunting. Air power is regarded by many officers of wide practical experience as an essential complement to sea power, whatever future the airship and aeroplane may have for independent action. A captain who is going to fight his ship successfully must have practiced in time of peace with all the weapons he will employ in action, and he must have absolute control over all the elements constituting the fighting power of his ship. In a larger sense, the same may be said of an admiral in command of a

fleet; divided control may mean disaster. The advent of aircraft has introduced new and, at present, only partially explored problems into naval warfare, and officers commanding naval forces will require frequent opportunities of studying them. They must be worked out with naval vessels and aircraft acting in close association. With the air service under separate control, financially as well as in an executive and administrative sense, is it certain that the Admiralty will be able to obtain machines and the personnel in the necessary numbers to carry out all the experimental and training work that is essential for efficiency in action? Is it also beyond doubt that unity of command at sea, which is essential to victory, will be preserved? In view of all the possibilities which the future holds now that the airship and aeroplane have arrived, it is well that there should be no doubt on such matters, for inefficiency might in conceivable circumstances spell defeat.

The following extract from Field Marshal Sir Douglas Haig's final report, while not touching directly upon the basic organization of the air service, indicates the importance of close cooperation between aviation and land troops:

It should never be forgotten, however, that weapons of this character are incapable of effective independent action. They do not in themselves possess the power to obtain a decision, their real function being to assist the infantry to get to grips with their opponents. To place in them a reliance out of proportion to their real utility; to imagine, for example, that tanks and airplanes can take the place of infantry and artillery, would be to do a disservice to those who have the future of these new weapons most at heart by robbing them of the power to use them to their best effect.

Every mechanical device so far produced is dependent for its most effective use upon the closest possible association with other arms, and in particular with infantry and artillery. Airplanes must rely upon infantry to prevent the enemy from overrunning their airdromes, and, despite their increasing range and versatility of action, are clearly incapable in themselves of bringing about a decision. Tanks require the closest artillery support to enable them to reach their objectives without falling victims to the enemy's artillery, and are dependent upon the infantry to hold the position they have won.

As an instance of the interdependence of artillery and tanks, we may take the actions fought east of Amiens on August 8, 1918, and following days. A very large number of tanks were employed in these operations, and they carried out their tasks in the most brilliant manner. Yet a scrutiny of the artillery ammunition returns for this period discloses the fact that in no action of similar dimensions had the expenditure of ammunition been so great.

Immense as the influence of mechanical devices may be, they cannot decide a campaign. Their true rôle is that of assisting the infantryman, which they have done in a most admirable manner. They cannot replace

him. Only by the rifle and bayonet of the infantryman can the decisive victory be won.

On January 12 of last year General Pershing expressed himself as follows, regarding a united air service:

Military forces can never be efficiently trained nor operated without an air force.

An air force, acting independently, can of its own account, neither win a war at the present time, nor, so far as we can tell, at any time in the future.

An air force by itself cannot obtain a decision against forces on the ground.

A military air force is an essential combat branch and should form an integral part of the army.

If success is to be expected, the military air force must be controlled in the same way, understand the same discipline and act in accordance with the army command under precisely the same condition as other combat arms.

An air force, as well as all other branches of the military organization must fully understand its exact functions in working with other branches, must know the needs of other branches, be in full sympathy with them, think in the same military atmosphere, and have the same *esprit de corps* in order that effective battle control may be established.

No such force can realize the above conditions unless it be an integral part of the command not only during battle but also during the entire period of doctrinal training.

To realize these conditions the different arms of the service must live together and train together.

An air force should be established as a separate arm of the service, coordinate with the infantry, cavalry and artillery.

An air force should not be established as a combatant force distinct from the army and navy.

In view of the definite opinions publicly expressed by leaders in the great struggle of the recent past, it is obvious that advocates of a united air service, if acquainted with actual conditions and requirements, are basing their arguments in favor of such an organization on other than military grounds.

DISCUSSION

REAR ADMIRAL BRADLEY A. FISKE, U. S. Navy.—Captain Craven's article seems so moderate, complete, convincing and sound, that no way of discussing it occurs to me, except that of paraphrasing what he says. I cannot forego the opportunity, however, of declaring my admiration for it.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

LEADERSHIP

By COMMANDER R. C. PARKER, U. S. Navy

FOREWORD

It is extremely gratifying to me, personally, that in response to the offer of a prize for the best essay on "Leadership," open to the officers and men of the Atlantic Fleet, excluding only the commissioned personnel of my staff, so excellent a treatment of the subject should now be available to the navy.

It was my object in offering the prize to obtain material for a handbook on "Leadership" for the use of officers, with particular reference to a naval officer's qualifications for the Leadership of enlisted men. But I wished also to encourage thought along these lines throughout the fleet's personnel and to this end invited the enlisted men to compete.

Both objects, I feel, have been attained, the one in the generous response to the prize offer and the interest taken in the contest by officers and men alike, the other in the text of this essay, so simply and so convincingly phrased that few indeed of those who start reading it will fail to finish it and a majority will keep it by them for future reference.

I don't wish to seem to attach too great importance to the benefit to be derived from a mere discussion of "Leadership." The example of, and training by, experienced officers is the only school in which real Leadership can be learned and often a post graduate course of hard years of experience must be added. But I have believed, and this essay confirms me in the belief, that if certain essential requirements embracing the best ideas of the service were clearly set forth in a handbook available to all officers, this training would be more easily and quickly accomplished to the good of the service.

The vital importance of personnel in the navy of to-day, and in the navy of the future, requires Leadership of the highest type. The thoughts expressed by Commander Parker will unquestionably help in the development of such Leadership. For this reason I sincerely hope that every officer and petty officer in the navy will not only read what he has to say but reread it and refer to it from time to time to keep the cardinal points he makes, fresh in his memory.

The publication of the essay in this convenient form makes this easy.

H. B. WILSON,
Admiral, U. S. Navy.

U. S. S. *Pennsylvania*, Flagship,
November 5, 1920.

LEADERSHIP

The following brief article has little enough to do with Leadership as a general subject. It would be difficult to conceive of a single thought, principle or viewpoint that has not already been enunciated by various able writers, ancient and modern; and what we might conceive to be our own originality on the subject would probably be merely our ignorance of what some wiser man had expounded yesterday—or a thousand years ago.

To the earnest student of the Art of Leadership there are always available three wide sources on which to draw.

First, the many excellent books and articles that have been written on the very subject; second, the lives and precepts of the really great leaders of all ages; and third, but not least, a clear recollection of those men under whom we have ourselves served, who by their methods and character succeeded in drawing from us the very best we had to give in loyalty, obedience and efficiency.

I think this last is perhaps greatest of all, being nothing more than a practical application of the Golden Rule—to deal wisely with others by imitating those who dealt wisely with us.

Never, I think, in the history of our navy has Leadership been so necessary a quality for the young officer as to-day. The general feeling of unrest throughout the world, the shaking of faith in old beliefs and in the established order of things, the spirit, not exactly of Bolshevism but of discontent with our own position and rewards, all are reflected more or less among us in the naval service.

The end of the war brought with it a most pronounced "let down" in morale, which, however distasteful to the disciplinarian, is at least not surprising to the psychologist. Human emotions are bound to move more or less in cycles. For every peak there is a corresponding valley; and the stimulus of war which stirred to a high pitch the qualities of enthusiasm, loyalty and sense of duty, did, unfortunately, like other stimulants, leave behind it a period of depression.

If I should advance the proposition that peace-time demands a higher quality of Leadership than war-time, it would probably be ridiculed as contrary to all established ideas. Yet, within certain limits, it is absolutely true.

Ask any of the men who held commands afloat in the war-zone and they will tell you that in many ways their work was made easy for them. Tremendous was the responsibility, but at the same time danger, excitement, patriotism all combined to foster an alertness and morale which gave the superior a confidence in the subordinate such as has seldom been enjoyed under more settled conditions. Eyes that are searching for the feather of a periscope or wake of a torpedo are not likely to become drowsy, nor is discipline hard to enforce when destruction may be the price paid for the lack of it. More than that, the common danger and the greatness of the cause developed almost automatically a mutual loyalty between officers and men which is not come by so easily when these factors are removed.

Yet the exercise of all our finer qualities in time of war is not enough. History is replete with instances where nations as well as individuals gave all that they possessed of leadership, patriotism, heroism and industry toward the prosecution of a war, and yet went down to defeat, simply because they *had* reserved them for war and not applied them to the fullest extent in time of peace. Wherefore those of us, young or old, who still cherish a few ideals concerning the service and intend to stick by it, must spur ourselves with the realization that the best we possess of Leadership should not await the call of some vague tomorrow, but is needed now, to-day, more desperately against the forces tending to lower our morale than against any enemy we are liable to encounter.

American officers have a more difficult task to handle and standard of Leadership to maintain than the officers of any other nationality. The very superior mentality of our men imposes this.

However much of a hero the European conscript may have proven himself to be, he has not the education or assertiveness to be intensely analytical of his superiors. Hundreds of years of the feudal and military systems have ingrained in him a respect for the officer caste and a ready belief in its superiority. The proper relationship between officer and man exists almost automatically.

But in the case of an American officer and his men, when first brought into contact, there is no existing relationship whatsoever, and it requires to be established from the very beginning.

And the problem is no simple one. For the ordinary American boy, on first enlisting, has not the faintest conception of discipline or military duty nor of the respect and obedience due to his superiors in rank.

How should he have, who never before heard of rank? Does he learn it at home? In the public schools? Is it something we have a right to expect of him like common honesty and morality?

Most certainly not.

The obvious fact is that this initial ignorance of his relationship to his officers is a perfectly normal condition and one which should never be allowed to cause a rise in blood-pressure on our part. And the work of establishing the relationship is as clearly part of an officer's routine duty as standing watch or caring for his battery.

Let us pause a moment, then, and look from the viewpoint of the recruit in the rear rank, seeing his division officers for the first time.

What impression do you make in his eyes, Mr. Junior-Officer?

Does he see you lolling and indifferent?

Careless or "non-reg" in your dress?

Diffident and apparently afraid of your own voice?

Blustering and brow-beating?

Giving orders in a "won't you please" manner?

Excitable and inclined to throw fits over trifles?

Or does he see you a proper figure of a man, self-confident, firm, courteous, military; and conveying the impression of being in command, not so much by the stripes on the sleeve of your uniform as *by virtue of the Man inside of it?*

Continuing the acquaintance, does he find you an active force whose presence helps the work along, or is it "Bo'sun's Mate, take charge?"

Do you so throw yourself into all branches of work that you kindle a like enthusiasm in him?

When the sun is hottest, or the rain has turned the coal dust to mud, are you there in the middle of it, encouraging?

Do you correct his mistakes consistently and thoroughly, or apparently just when the mood strikes you?

When he transgresses the law do you deal with him in such fashion that he realizes why he was wrong and should henceforth

do better, or do you merely give the impression of having worked off a fit of temper?

Does he feel that being in the same division, same ship and same service with yourself is a bond between you, or a barrier?

If in trouble or needing help or advice, are you the first man he would turn to, or the last?

Are you a true leader in the sense that your *influence and example make men give freely of their best efforts,* or are you a sort of human lemon-squeezer that by dint of much pressure extracts a little sour obedience?

All these questions it were well to ask yourself before looking in the mirror with too much satisfaction and asking permission to go ashore!

Have faith in your men!

I do not believe that any officer who habitually mistrusted or looked down upon his men ever yet achieved success as a leader. Picton at Waterloo may have led his troops to the charge with the words, "Come on, you damned thieves and pick-pockets," but I will venture to say he *smiled* when he said it, and *led,* not drove them.

Too often nowadays one finds a young officer sitting in the wardroom and growling about the short-comings of the enlisted personnel he has to deal with.

Are they lazy? *Be you industrious.*

Are they dirty and unmilitary? *See to it that you are above reproach yourself.*

Is their morale low? *Then for shame's sake, stop whining, get up there and show them what a man should be!*

STUDY THEM, WORK WITH THEM, GUIDE THEM; report whom you must and commend whom you can, but whatever you do, *never lose faith,* for when that happens, it is not they who are hopeless but you who are beaten.

If you are well born and brought up, with a background of family, and your government has spent four years educating you, and gives you rank and position in the world, what is it all for, if not that *you may have something to give in character* to those whose start in life was less fortunate?

And rest assured that teaching even one hopeless specimen to hold up his head and take a man's pride in himself, is THE GRANDEST WORK AN OFFICER CAN DO—better than writing fifty articles

on "Leadership" or on "The Higher Ethics of the Fire and Bilge Pump."

The MAN is the thing, not the machine or the idea or the regulation. We are too prone to work for results alone without considering that the *real* problem is the MAN on whom we should depend to get those results.

As a humble example:

Suppose our first sailing launch, under care of Bill Jones, coxswain, has continually fallen below the required standard of cleanliness.

Now, our primary mission and objective should be, not the sailing-launch, but Bill Jones himself.

By heckling and driving we may finally get the boat fixed up for inspection—and thereby have accomplished a little.

But if we are able to get Bill Jones himself fixed up, to get him to take a pride and intelligent interest in his boat, then we have accomplished as much *and a great deal more.* For not only is the boat now clean, but Bill Jones has become an *asset* instead of a liability, and THE SEED THUS SOWN TENDS TO MULTIPLY ITSELF.

Farther back than this, the same principle holds good.

You yourself bear much the same relationship to Bill Jones that he does to the boat. Get *yourself* fixed up; get yourself in the proper relationship to your men; *make yourself a true Leader;* and all the Bill Joneses and sub-Bill Joneses and their boats will in due course fall into line, and the whole lump be leavened.

If something is wrong, set it to rights by all means, but do not stop there.

Why was it wrong? Did some human element of the system fail?

Then repair *him.* Reprimand him or encourage him; teach him or court-martial him; retain him or get rid of him; handle him in whatever best way heaven gives you wisdom to do, *but don't leave him to muddle along unrepaired.*

And when you are through with him, then go back one step farther and ask yourself, "What was wrong with *me,* that *he* should have been wrong?"

There is an expression current among salesmen, I believe, to "sell" a man, meaning to convince him that their line of goods is the best and is what he needs.

The man who desires to exercise true leadership must "sell" himself to his men in the same way, to the extent of carrying to them the conviction that he *is* the man best fitted to command.

Were we always engaged in battle or emergencies it would be comparatively simple, but failing that, the leader must identify himself as such by certain invariable characteristics.

ABILITY

The young officer, at least, should be able to do everything that he requires others to do, and do it better, no matter how small the detail or humble the task. When the men find that you *are* right even in small things, they will have faith in you for the bigger things.

LOYALTY

There is loyalty "down" as well as loyalty "up," and one cannot exist without the other. As you feel toward your men, so will they feel toward you. Give, and unto you it shall be given.

TACT

It is the lubricating oil of human relationships. The man who considers tact unnecessary in dealing with subordinates is probably the same man who hammers his sextant with a monkey wrench to make it work!

JUSTICE

It is not enough to think yourself that you are just and fair; make your men think so, too. You do not demean yourself by explaining the why and wherefore of an order or decision. A sense of injustice will kill spirit and morale quicker than any other agency.

COURAGE

We know you have it; but take heed that never by the slightest accident or error your men get the idea that there is any danger you would not undergo or hardship you would not share with them. If ever you lose your nerve before them, pack your trunk and get transferred quickly.

TRUTH

Tell them what you, when you can. Neither conceal nor exaggerate nor minimize. Keep your word whether it be to give a

promotion or a court-martial. Better never to make a promise than ever to break one.

FIRMNESS AND CONSISTENCY

Be firm as a rock when right, but never obstinate. If wrong, admit it, and you will gain rather than lose in prestige. Finish what you start. Never give up. Never blow hot and cold according to circumstances, but invariably live up to the same principles.

The foregoing are a few, a very few, of the points which no officer can neglect. Ceaseless study and constant effort are none too much. For in the final analysis, ***he who has mastered the Art of Leadership has mastered everything, since through others, all other arts are subject to him!***

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

NEW WINE IN OLD BOTTLES

By CAPTAIN J. S. TAYLOR (M. C.), U. S. Navy

We are credibly informed that in the remote past a community of diminutive rodents was annoyed and decimated by the frequent inroads of a certain predatory feline. In council assembled it was decided that the wisest procedure would be to fasten to the grimalkin's neck a tintinnabulator of some sort by which warning of his approach would unfailingly be given to his contemplated victims in time to permit their escape. The question next presenting itself and one for which no solution could be agreed on was: "Who will bell the cat?"

There is very general agreement in the United States Navy that it is desirable and proper to give precedence to the best man and that merit should be the basis of promotion, but a great many of us do not believe in the present system of promotion which is not necessarily based on merit just because it is officially declared to be so based. Likewise, however strongly we may, as individuals, hold to certain opinions, we are probably agreed that in the past few years under the system now in vogue some men of conspicuous merit have been promoted along with others of less conspicuous merit, while some men have been passed over or have failed of promotion who, in the opinion of at least a respectable minority and probably in the opinion of the majority of service men, not members of the board, had merit equalling or surpassing that of the persons selected. If we are united in a love for the service that is something more than a liking and taste for it and includes a consuming desire to see it become an increasingly efficient instrument for the purpose intended, and if, in consequence of that love, we are able and willing to consider with fairness and liberality important phases of its administration, we cannot decline to admit that serious discrepancies of honest opinion regarding

the correctness and justice with which merit is determined demand careful scrutiny of the system of selection. The fundamental practical fact to be established in discussing the present system is not whether merit should be the basis of promotion, but *how* merit is to be determined and to what extent it *can* be determined by the system in vogue or by any other system. The scheme of belling the cat was an admirable one but it failed from being impossible of execution.

The first, because the most self-evident and incontestable, objection to the scheme of promotion by merit was that it involved a breach of contract. The system was imposed on men who had entered the service and served for periods varying from 5 to 25 years or more on a very distinct understanding, affirmed by statute and intrenched in the precedent and practice of military establishments the world over for centuries, that their promotion would be determined by seniority, subject to examination to determine physical, moral and professional qualifications. We entered the service on this basis and regulated our lives in matters of health and conduct and professional attainments so as to conform to prevalent standards in these particulars in order, when death, resignation or retirement created a vacancy, to qualify by record and examination for the next higher rank. Suddenly all this was changed and a new system of promotion was put into effect with the consequence that many men who had modelled their life upon and were fully up to existing requirements could not meet the new one, though not necessarily through lack of merit of one kind or another. It would have been perfectly permissible to announce that after a certain date all persons entering the service, or that, beginning 5 or 10 years from the date of enactment, all persons then in the service, would have their relative merit and standing determined by a new method.

Before discussing further valid objections to promotion by selection (to call it promotion by merit is the special pleader's favorite device of calmly assuming as proved the very subject under discussion) it is pertinent to consider the old plan of promotion by seniority. Here, too, it is possible to be specious, to employ the *argumentum ad hominem*, to make subtle pleas which appear to appeal to judgment but really invoke prejudice and rest on prejudiced and preconceived ideas. "What!" says the civilian, who as a civilian is inferentially free from the jealousy, the ani-

mosity, the narrowmindedness of the military man, " you believe in promoting a man because he is old! " The legitimate answer is that, subject to considerations of health, integrity and mental attainments, experience of military affairs is essential. This is the great but concealed reef where so many well formed plans of comity betwen military and civilian come to grief. It is the common opinion among the non-military that any brave man can be a good general: that if to courage we add the possession of a yacht or the ability to take a ship alongside a dock or to navigate ships across the ocean we have all the qualities going to make a good admiral. We refer the curious on this point, if such there be, to the introduction to Colonel Henderson's life and campaigns of Stonewall Jackson and to a study of all the written and unwritten history of amateur commanders and proceed, merely noting that the practical working of the system of selection permits though it does not compel an utter disregard of the qualification for promotion known as experience.

The old system of promotion by seniority theoretically considered was ideal, just as any plan is ideal which, like it or the one now substituted for the old one, pretends to promote men strictly on merit. Let it be understood that the old or seniority system aimed just as high as its successor and let it not be assumed for a moment by its opponents that it was devised without such safeguards as the intelligence and patriotism of the time could suggest. On the occurrence of a vacancy the officer with most experience was tested as to his fitness to succeed the late incumbent. He appeared before boards of officers who endeavored to determine his physical, moral and professional title to promotion—boards of officers under a solemn oath to decide upon his merit without partiality or prejudice. In theory this was promotion by merit. Except that it gave a certain preponderance of weight to experience, it did not essentially and materially differ from the intention of the plan now in operation.

In practice, promotion by seniority was not an unqualified success. The " plucking board " was established to make good the deficiencies of seniority promotion. The plucking board annually removed from the active list a certain number of officers whom it adjudged among the less meritorious officers of the service. It did not remove them *all* or at least it had no statutory power to remove them all because the number to be plucked each year was

fixed. The ostensible advantage of the plucking board was that it increased the flow of promotion by creating vacancies through the elimination of "dead wood" at the top of certain specified grades. The examining boards should have done this and would have done it if the needs of the service and the individual had been more broadly considered by the lawmakers. The operations of the plucking board were not wholly satisfactory or at least did not give unquestioned and general satisfaction because all the weaker vessels were not invariably consigned to the "back channel" and because, from time to time, a man would be plucked who had been regarded by a goodly number of his professional associates as a good man. It is perfectly clear that had promotion by seniority worked properly it would have eliminated the men actually left to be eliminated by the plucking board and would have made the latter less necessary. (We say less necessary instead of unnecessary because a man could be plucked who was not immediately due for promotion and so might otherwise wait years before a vacancy above him brought him to trial before the examining boards.)

If promotion by seniority was a satisfactory arrangement why did it create dissatisfaction in any circles? The answer lies in part in the frailties and weaknesses of human nature and in part in a frank lack of recognition of one essential feature of seniority promotion which has never been provided for. The examining boards should be supplemented by another board which might be called the Assignment or Classification Board (*vide infra*).

By the frailties and imperfections of human nature we mean an unconscious, an unintentional partiality combined with error of judgment on the part of those honestly attempting to do their duty and very far from any purpose or willingness to violate the oath taken as members of the examining board. There is undoubtedly a strong disinclination on the part of an examining board to adopt an aggressive policy of elimination not called for by law. To reject an officer for promotion or to disqualify him for the service after he has served for many years with zeal and faithfulness because of temperamental defects undeveloped or unperceived at the time of his admission to the service, defects which time, trials, disappointments and perhaps injustice have accentuated, is not a grateful task, especially if he has lovable qualities, is in many ways meritorious and above all is recognized as a man

of high integrity and worthy purpose and considerable ability. Let us take a concrete example. An officer who has done well as navigator, ordnance officer, first lieutenant or even as the executive officer, comes at last to command rank. His technical knowledge of his profession, his enthusiasm for it, his loyalty, courage and patriotism are beyond question, and yet as the captain of a ship he proves to be by no means an unqualified success. Long years of subordination to military authority may have so warped or dwarfed his field of vision that he has become a martinet misinterpreting the purpose of discipline or unable to maintain it in its broadest and most useful conception as an agency for expression and expansion instead of for repression. Again he may be lacking in the inherent qualities that make for successful handling of men. Or he may have developed an excess of caution and regard for technical checks on initiative which amounts eventually to timidity in execution. This candidate is sound physically and upright morally, and he is so highly developed mentally that he has no difficulty in putting on paper brilliant answers to the professional questions propounded. The defects noted above are recognized by the individual examiners but they have no written or official evidence before them of these defects. They are matters of personal opinion and the board may not be unanimous in recognizing them. In view of all the positive accomplishment and the high moral standing, combined perhaps with great personal charm, of the candidate, he is promoted, the board taking the position that his deficiencies in one particular are abundantly offset by positive merits in another and that there are many posts of importance in the naval service which he can fill with success and advantage to it besides the one duty of command (*e. g.*, Naval Observatory, Navy Department, War College, Naval Academy, service as attaché, etc.). The board balances the pros and cons and considers the good outweighed by the bad. The judgment of the board may be in error, for human judgment is fallacious and honest intentions in candidate and in examiners are no guaranty of infallibility. Happily the consequences of error are not always serious. Men develop as well as deteriorate. Many a commander who made a failure with his first ship becomes in time a very successful one, just as some who are remarkably successful at first disintegrate later and become the source of regret and dismay to the boards that promoted them or to the authority that assigned them

to duty of paramount importance. On the other hand boards frequently recommend the promotion of an officer whose case was made the subject of earnest discussion because of very definite grounds for mistrusting his abilities and under the stimulus of a larger responsibility and with a wider scope for his activities he comes in time to more than justify the recommendation made by the board with some misgiving. It is not only that examiners are human; candidates are human too and have all the faults and all the virtues of other people.

Now, under the old system, the presumption of right to promotion depended on the candidate's experience and in the absence of distinct and well sustained evidence of a counterbalancing fault or deficiency he was passed. The reports of fitness, so-called, were really in a sense designed to record unfitness, if discovered, and so absolutely in conformity with the system. In law it is held better for many guilty to escape than for one innocent man to suffer. The promotion by seniority may have rewarded some whose merit was not conspicuous but it rarely if ever so miscarried as to punish the truly meritorious.

The selection system is entirely different. With the purpose of adequately rewarding a few supposed to be conspicuously deserving it constantly blasts the future of many who rightly or wrongly are equally or almost equally deserving, estimation of the relative deserts turning on varying shades of opinion. The placing of new wine in old bottles consists in utilizing for the purpose of determining merit a set of records gotten up not so much to show conspicuous merit as to record evidence of disqualifications. The reports of fitness are not a perfect instrument because it is difficult to obtain unfavorable reports due to cold, dispassionate judgment. An unfavorable report involves showing the damaging comment to the object of it and embodying his reply with the report. The reply often takes the form of retaliatory and incriminating revelations about the author of the unfavorable report, a circumstance which necessarily often restrains the reporting authority from being too conscientious. However, human nature in its more likeable aspects of charity, kindliness and optimism often asserted itself in another way and led to passing over defects or irregularities that would have been noted had the consequences of perfect candor not involved possible disaster to a subordinate rightly esteemed to have in him much good to counterbalance the bad.

If I am right in believing that the testimony of the reports of fitness, part of a system of promotion by seniority, was of value mainly to prevent the promotion of the undeserving and therefore of great value to plucking boards, such testimony is not the ideal testimony on which to base promotion by selection. Officers who have served on boards of selection will, I believe, agree with me that there has been a very distinct, a very material and conspicuous alteration in the general type of replies to the interrogatories on fitness reports since selection became law. It should not for a moment be supposed that there is anything to be criticized in this. The change in the tenor of the reports is not wholly a conscious and deliberate one. It is therefore all the more significant of the inadequacy of the old form under present conditions. It is an effort to make it conform to the very different needs of the present.

Two suggestions are inspired by the foregoing considerations. Should there be a return, in the future, to promotion by seniority certain adjuvants to the working of the system could and should be introduced. If the plan now in vogue is to be permanent it requires modification in at least one vital point.

The suggestions regarding promotion by seniority are tentative, made with the purpose of inspiring men infinitely better qualified than the writer to contrive a definite, practical scheme for its regulation and control in the interest of the government and of the individual officer. Under the seniority system an officer who failed of promotion was entitled to reexamination at the end of a year. If he then failed again he was wholly retired. To be wholly retired is a fatal blow to any but the most youthful officer. A man who has been educated at the Naval Academy along more or less strictly professional and technical lines and has then devoted even ten years to strictly naval work may find it difficult to earn a decent livelihood. The difficulty increases with the time consecrated to the service. Except where failure of promotion results from definite moral deficiencies there should be some financial provision to keep an officer wholly retired from absolute destitution. The officer wholly retired within ten years of graduation is a relatively young man. The officer who has served 15 years after graduation has reached middle life. The latter should receive a small annual compensation. This should be larger for the officer of 20 years service and after 25 years of service subsequent

to graduation should amount to perhaps three-quarters pay, the amount now authorized by law for those retired for longevity. With some such provision the eliminating action of examining boards would unquestionably be considerably increased and to that extent there would be a premium on positive merit and an accomplishment of the purposes contemplated in the establishment of such boards.

Another aid to the seniority system would be the creation of a Classification or Assignment Board which would have power to determine and restrict the field of labor of an officer in whom talents were unequally balanced, in whom conspicuous abilities along important lines were offset by limitations or defects reducing his efficiency for any and every type of service. There must come sooner or later, and already there are abundant signs that the best naval thought and conviction recognizes the truth of the contention, a more general and a more active acceptance of the importance of what may broadly be designated the personal equation in military administration. The importance of the study of personality has already shown itself in efforts classified under improvement of morale, in psychological tests of efficiency, etc. So rapid and revolutionary have been the recent changes and readjustments in social, financial and industrial life in this country and throughout the world that military administration, always a matter of peculiar difficulty in this country, is more than ever the feature of our service upon which the great issues eventually depend. The disciplinarian of fifty years ago would be an insupportable anomaly to-day, and yet discipline, strict and uncompromising, remains and always will remain the sheet anchor of an efficient service.

It is time that the service took cognizance of the fact that the officer who is unsuccessful in handling men should not be assigned to handle them. The brilliant mathematician, strategist, exponent of military law or history; the man qualified for diplomatic and intelligence work, for teaching, for scientific research who cannot handle men must not command a ship and breed discontent and foment desertion, displacing from command or delaying advent to command rank of those gifted with the personal and temperamental qualities making for successful command. If a perfect analysis could be made of all the feelings, forces, dispositions and experiences which make up the sum total of honest and disinter-

ested dissatisfaction with promotion by seniority and consequent inclination to some other method, it would probably be found that promotion of those handicapped by temperamental unfitness for command was the essential evil of the system. But men unfit in this particular are promoted from the very reasonable feeling on the part of boards that such men can be useful servants in other lines. Unfortunately there is no definite policy or provision for diverting them from the field in which they can do harm and restricting them to the fields in which they can accomplish much positive good.

If promotion by selection is to continue it is high time that a well considered and well digested system be established for the determination of merit. The first and the most essential step in the writer's belief is the repudiation of the fitness report in its present form. If, for the maintenance of discipline and for the information that the present reports may furnish to the Department, these reports are retained, they should, for purposes of determining conspicuous merit, be replaced from some definite date by a wholly different type; and none can claim that anything but conspicuous merit should outweigh the combination of fidelity, intelligence, uprightness and experience, in the matter of eligibility for promotion.

Any one who has served on a selection board has had this experience. He goes over the reports of fitness of a given number of officers. A large proportion of them have approximately the same marks, the same favorable comments. If he and other members of the board are personally acquainted with the officers on the eligible list and personally acquainted with the reporting seniors the marks and comments can be interpreted intelligently and some estimate of a given candidate arrived at. If on the other hand Jones and Smith are wholly unknown quantities and the reporting seniors on Jones and Smith or a goodly proportion of them are likewise unknown, or but little known, the determination of merit comes down to an effort to determine which has the fewest discoverable defects.

But, in selecting for merit, defects may have a power to mislead. An officer may have a quick temper, he may be careless of minor details of routine procedure, he may even have virtues of a kind which involve him in minor troubles with superior authority and compromise his record and yet in the predominant note of

his character he may be highly qualified for handling big issues and obtaining large results. The very trifles which lead to a record cumbered by unfavorable comments in relation to the letter of the law may be indirectly the index of high capacity and sagacity. Such a man may be a born leader and consummately successful in inspiring loyalty and securing cooperation. Let us pit against him the negative character who, for very lack of initiative, enterprise, moral courage and determination to do his duty without fear or favor, never arouses antagonism or makes an enemy. He never commits a conspicuous error of judgment because he never dares to have a judgment of his own. He never incurs criticism in an important issue because he avoids issues. The slave of routine and the master of policy, he comes through unscathed from every situation that holds possible disaster for the man of daring and resolution. Such a man's record may, by its negative character, easily outclass the record of the man who does things and says things of value, the record being damaged by the occasional error or failure. The precept which makes a clear record indispensable to promotion by a board of selection thus stultifies the vital purpose of selection and becomes comparable to promotion by seniority when the latter is shorn of its prime feature—the recognition of the value of experience.

The danger of forcefulness is well illustrated by the matter of indulgence in alcoholics. It is certainly nothing against a man to be a total abstainer. Total abstinence, though occasionally due to the consciousness on an individual's part that through inherited or other limitations a single drink may lead to disastrous consequences, is usually credited to a man as an index of stoicism and fortitude. On the other hand the disposition to imbibe may indicate a jovial, social disposition and personal qualities not without value, while the tendency to get drunk and then disorderly may actually be due to an aggressiveness that often goes far in the business of life. Ten years ago moderate drinking was a perfectly legitimate indulgence. Twenty years ago it was a very general practice that entailed no opprobrium. One hundred years ago it was a virtue in the eyes of all but a few. The man who succumbed at one bottle of after dinner port was lower in popular esteem than he who could survive two, while the palm for manliness, both physical and moral, was awarded to him who could negotiate three. The four and five-bottle men were prodigies. We all

know that to take a drink may mean taking three or four drinks and the three or four drinks may lead to trouble. The trouble may get on one's record and may not. For lack of a full knowledge of the ways of Providence we ascribe the very dissimilar consequences of taking a drink to luck. We do not disqualify a man for promotion by selection because he used to drink but because he had the misfortune to have this incriminating detail involve his record. He may actually have foresworn liquor and been generally and markedly improved by the cruel experience; the experience may indirectly have developed character and led to enormous increase of potential. Such a record, however, placed side by side with the record of a blameless nonentity makes its possessor go down in the contest for promotion.

The prime need of selection is a constructive record, a record of positive achievement, of definite and conspicuous achievement; a record that shall be a blank in the case of mediocrity; a positive and not a negative sheet. Supervising authority may make such use in executive action as it may see fit of the chronicle of misdeeds and the board may if it so chooses modify recommendations because of previous errors, but the determination of merit should be primarily based on positive performance. Those on whom would devolve the task of preparing a form for a constructive record would have ample aptitude for this work and it is only in elaboration of the fundamental idea that the subject is pursued further in an elementary manner by way of illustration. Admitting that selection by merit is to widen the scope of usefulness for unusual merit, let the record call only for favorable entries, for entries of real and marked excellence of powers and performance. To-day if a man "has anything on his record" he will be passed over by the tribunal because the significant things in records as they are now gotten up are bad. Our idea is that a man who has nothing on his record should not be promoted; that is to say, the record should be a summary of good things done and of encomiums pronounced. We should so word its interrogatories that there would be no call for entries except in the case of a peculiarly meritorious act or unusually marked display of ability. There would be no call for any but favorable comment where that could be conscientiously made with the understanding that it determined fitness for selection for unusually important and responsible duty. The report would be headed "Confidential Report of Marked

and Unusual Qualifications for the Naval Service." It would be filled out by the commanding officer assisted by his heads of departments. There would be some such legend as this at the top of the paper. "This report shall not be filled in as a routine procedure but it shall be so transmitted. A blank report containing only the name, rank and station of senior and subordinate will be interpreted by the Department to mean that during the period he has been under your command the officer reported on has not had the opportunity or occasion, or else has not had the capacity, to conspicuously distinguish himself from others of like station and duties. This form is not to be employed for reporting negligences or derelictions of duty and conduct. A form forwarded in blank does not mean censure but merely that unusual and conspicuous ability segregating him from the average officer has not been shown."

The phrasing of the reports would be on this wise:

I have been *particularly* impressed by.....
I consider this officer *more than ordinarily qualified* for.....
This officer is *preeminent* in.....
This officer has displayed *conspicuous* courage or gallantry.....
This officer is *peculiarly adapted* by temperament, bearing and viewpoint to .....
This officer is *unusually diligent* in the study of.....
This officer is *more than ordinarily gifted* as.....
State the particulars, if any, wherein this officer appears to show *exceptional* ability .....
This officer excels other officers of his grade and station under my command .....

These incomplete sentences are inserted to show the degree of merit which would demand notice and no attempt is made to cover technicalities such as drill, navigation, engineering, teaching, organization, discipline, etc. These should of course be covered in detail.

It might be well, in view of the significance which would attach to the report, for those devising it to consider the wisdom of allowing space for an expression of opinion from the heads of departments in which a subordinate did duty, given in their language, over their signatures, endorsed, modified or negatived by such remarks as the commanding officer saw fit to make. The captain may not always be in a position to have as full a knowledge of a subordinate's capacity as another officer. The executive offi-

cer, for instance, may be consulted and express a highly favorable opinion which the captain may rightly or wrongly not show in his report. Either officer is likely to be in error but it may happen that the executive's judgment is the better in a particular instance and since we would here be dealing in praise the situation is totally different from that in which blame is involved. Blame from the commanding officer calls for punitive action by or through him and he should not be compelled to initiate it against his own conviction of guilt or innocence.

What would be the practical result of the *constructive system* of records? At the end of 5, 10 or 15 years there would be a certain number of officers whose records would not contain a single entry relating to marked, unusual and conspicuous talents or accomplishments. Others in the same grade would have perhaps one or two such entries. They might all relate to one feature or the several reporting seniors might emphasize different aspects or qualities calling for special commendation. There would be a few officers whose records would show grounds for praise in many particulars and almost uniform agreement on the part of the reporting officers. With what comparative ease and justice a selection board could sort and classify reports of this type. The negative characters would be grouped together, likewise the men eulogized for a single praiseworthy characteristic. The smaller number whose numerous claims to recognition were concurred in by many superiors would form still another group. If the promotions authorized were few they would perhaps be made from the last of the classes given. If many promotions were called for the men in the other categories would be taken into consideration.

Naturally such reports would mean little for the younger officers whose service and opportunities had been limited but the lapse of time would produce an ever increasing differentiation between the positive and the negative types.

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SOME SOUND PHENOMENA CONNECTED WITH GUN-FIRE

By COMMANDER GARRETT L. SCHUYLER, U. S. Navy

This discussion of some of the simpler points in the sound phenomena of gun-fire is in no sense orginal. In fact, the theory was clearly stated and published years ago, although until the war it was of no special popular interest. Since then, however, these phenomena have taken on a new interest, because so many at the front heard them and occasionally their safety depended upon an intelligent understanding of them. One is impressed by the great extent to which those of all ranks in various armies who have had active service with artillery know the facts connected with the peculiar noises heard, even if in all cases they have not heard much about the reasons for them. In the navy this information is for many reasons much less widely diffused. There are certain striking and easily remembered conclusions which we may well spare a minute or two recalling to mind, or which might be included in future text books on naval gunnery. There are one or two special naval applications of the phenomena that may be mentioned, and a few popular fallacies which can be disposed of. One may therefore perhaps be pardoned for referring here to phenomena which are so largely a matter of common knowledge.

A projectile moving at a high velocity generates a sound wave of conical shape with the projectile always at its point. It is quite analogous to the V-shaped bow wave that a ship makes when under way. Bow wave analogies are perhaps the easiest way to illustrate the sound phenomena. For low speeds the sides of this conical sound wave make a large angle with the axis of the projectile, just as at slow speds the bow wave of a ship is pushed along and stands out at a large angle on either bow. High velocity projectiles make a conical sound wave of a more acute angle, just

as at high speds the bow wave of a ship extends behind at a much smaller angle with the keel. The semi-angle of the wave, that is, the angle between the direction of motion of the object producing it and the line of the advancing wave front, diminishes as the speed increases. The sine of this angle is the ratio of the velocity with which the disturbance is propagated in the particular medium, and the velocity with which the object producing the disturbance moves. If, for example, the projectile moves twice as rapidly as sound travels, the sound wave extends out at 30° on each side of the projectile, 30° being the angle whose sine is one-half. This can be verified by a simple geometrical construction. As an origin, take a point on the paper and assume that it represents the location of the projectile at a selected instant. The idea is to construct the form of the sound wave at the time when the projectile is at that point. On some appropriate scale mark back from this origin the path by which the projectile arrived. On this line choose other points at intervals, each representing the projectile at certain earlier instants. Take each of these points and consider the time the projectile took to get from it to the origin. See how far, according to the scale, sound would travel during this interval of time. From the point draw a circle of radius equal to such a distance. The envelope of these circles, or the line which could be drawn around just touching and enclosing all of them, will thus define the wave front at the time when the projectile is at the origin.

If the projectile is moving at a constant speed, then the radius of each circle and the corresponding distance from its center to the origin will compare in the ratio of the velocity of sound and the velocity of the projectile. If the projectile moves at a varying rate, or on a curved path, the wave front will not be composed of these two straight lines, but will be somewhat distorted, just as the bow wave would be from a ship in deep, calm water if it steered a changing course and went at a varying speed. By laying it out in detail the special form of the sound wave in any given case can be readily arrived at.

We have many evidences that this conception of a conical sound wave being generated by a high-velocity projectile is reality, and not a mere hypothesis. Spark photography is perhaps the most convincing evidence. A projectile moving in the dark touches two small wires and causes an electric spark of extremely short

duration to be made just over it. A sensitized photographic plate lies below it and a shadow picture is made. On the shadow picture a silhouette of the projectile, which was illuminated for only the briefest interval of time, is shown clearly and dark with very distinct edges. Perfectly sharp lines represent the sound wave previously described. This representation of so intangible an object as a sound wave results from the fact that the density of the air in it is greater than the density of the air around it. The index of refraction in a sound wave is different. Consequently rays of light passing through this region from the spark to the photographic plate are slightly deflected in passing. They turn differently, and so on the photographic plate no ray arrives which would pass directly from the spark in a straight line through any portion of the sound wave. There is a dark line on either side, as sharp and clear as the shadow from a wire. Knowing the velocity of sound and measuring the angle between the sound wave on either side and the axis of the projectile, we can estimate the velocity of the projectile. The velocity of the projectile can be measured by other means, and the agreement is a convincing check on the correctness of the theory.

When on the front one hears an enemy long-range gun dropping shells in his vicinity, there is at first a loud report, then a whistling noise and then the report of a shell exploding. Many are likely to think that the first report heard is caused by the discharge of the gun. If the matter is studied it will be found that in general this report occurred so closely before the fall of the projectile that it could not possibly have come from the gun and arrive so soon after the projectile. Furthermore, this first report is much too loud to come from a distant gun, particularly with an unfavorable wind. Yet it is always heard in any kind of weather. It is merely the sound wave from the projectile.

Experienced observers in well established parts of the front can tell with surprising accuracy just where projectiles are landing. The sound which reaches an observer seems to come from close on either side of a point in the trajectory where the component of the projectile's velocity resolved toward the observer is equal to the velocity of sound. If on one day the enemy is shooting low and on another day the projectile is a little higher, in both cases the point from which this false report apparently originates is very nearly in the same place as regards the observer. In the two

cases, however, the distance that the projectile travels beyond these points before exploding on the ground may vary considerably. Hence the interval between the sound of the false report and the sound of the projectile bursting may be quite different in the two cases. It may be, for example, an interval of four seconds in one case, and eight seconds in another. It is quite easy for the trained ear to distinguish, and the difference is sufficient to indicate with surprising accuracy where the projectiles are going. It should be understood that the estimate is made not by working out by formulas, but in a simple practical way. The observer finds out on different occasions where the projectiles are landing, and remembers, or notes down, what it sounds like. If he hears that sound again, he knows where the projectile is falling to cause it. It requires no intelligence, but only a memory, and many do it very well without being able to tell how they do it. It is interesting, perhaps, for those of us in the navy to know that this can be done, though it may not have any special naval application.

Another thing that should not be lost sight of is that the false report comes from a point which is not in general between the observer and the gun, and therefore, if he tries in this way to guess the location of the gun which is firing projectiles landing to one side of him, he will be entirely misled. Of course, if he knows where the guns are he can recognize one or the other by the similarity of its sound and the sound which he previously heard from it; but he could not locate a new gun in this way. It would be much like an observer off a port in a small boat in calm, foggy weather, feeling the bow wave of a steamer which had just come out of port and was passing near him in the fog. If it were an old experience he could compare it with what he had experienced before, but without previous experience he could tell the direction from which the bow wave seemed to come to him in the fog but this would not indicate to him the direction of the port from which the ship had started. Artillerists are always cautioned not to do this kind of guessing unless they know where the guns are and have heard them before. This does not, however, apply to very distant firing, such as a general action miles away. In that case we hear the guns themselves, rather than passing projectiles, and it is possible to make a very fair estimate of the direction of the artillery activity.

In naval gunnery where the remaining velocity of the projectile is greater than the velocity of sound, it follows that one will never hear the approach of the projectile which strikes him. It is the same thing as the proposition that a relatively motionless ship is not going to be rammed by a high-speed vessel which does not change its course and from which we experienced the passing wave.

A fallacy which one often hears is that the impact of projectiles on the water makes a loud noise like a report. Those who hold this view have usually arrived at it from noting that on target practice there is a loud report, which is not the discharge of the guns, and which can be heard on the towing ship at about the time the projectiles strike the water. They assume that this impact is what makes the noise. It is nothing more than the sound wave of the flying projectiles which reaches them.

Although usually only the false report made near the end of the trajectory is heard, it is possible under certain conditions to hear more than one such report. This is particularly true in very curved trajectories. It is no more difficult to comprehend than would be the arrival of bow waves at different times at a small anchored boat from a large vessel steaming around near it with considerable variation of course and speed.

If a projectile falls short of us the wave continues on and reaches us, as explained before, and the report is not a noise caused by the impact of the projectile on the water. A wave generated in the air has simply travelled on and reached us. It is like a vessel coming towards us at high speed, and suddenly stopping engines and anchoring. If not too far away her wave would leave her and travel on to reach us. It would not be a disturbance generated by the ship stopping, but would be the arrival of a disturbance previously accompanying the ship but continuing on after the ship had stopped.

In naval gunnery when we are near guns firing (either on the same ship or on one with it in formation) echoes often return. It is surprising what an excellent reflector of sound the side of a near-by ship can be. This is often noted with boats passing near the proving ground.

When one is fairly close to a gun which is firing he often hears a double report. One is the false report from the projectile, the other is the report from the gun. Illustrating by analogy with

waves on water, it is much like dropping a heavy toy boat into a tank and immediately starting to tow it along. There would be a circular wave from the original splash where the toy boat fell in and started from, and there would be the V-shaped bow wave which it carried along while being towed. We could select many points where both of these waves would be experienced separately, and in some places where they would be experienced separately they would be of very nearly the same character. Thus, it is not surprising that in the field at certain distances, and on certain bearings from a gun, a single gun may sound like two guns being fired. This happens sometimes at sea.

The principal conclusion that we can draw from this discussion is that all points of the theory of the sounds are well understood and were worked out years ago. There are very great differences in the characters of sounds which we are likely to hear on shore with artillery. This enables artillerists to tell a great deal from sounds, but their success depends almost entirely upon knowing local conditions, knowing where the enemy's guns are, and, having heard something which they can find out about, remembering what it sounds like so that it can be recognized if it is heard again. At sea these advantages are not possible, and noises from gun-fire, in themselves, can tell us little. We can, however, judge approximately the direction of distant firing. The sharp report just before the projectile lands would be a most misleading indication of the direction from which it had come. One could not hear the arrival of the projectiles which strike the ship. On occasions, double reports may be heard. The reports which one hears on target practice when projectiles strike the water are not made by impact, although it often seems as though such were the case.

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THE SOUL OF THE SERVICE

By CAPTAIN E. P. JESSOP, U. S. Navy

Motto: "Lest we forget"

At the present time when the influence of our rapid naval expansion during the Great War and the subsequent demobilization of equal rapidity have left the service shaken to its foundations, uncertain as to the future, harassed by present requirements, and bewildered by the general chaos, it would appear to be in order to attempt to restore orderly and logical thinking on the needs of the service with special reference to measures necessary to prevent permanent injury to service morale and service viewpoint from the peculiar kinds of slackness which any war must develop and which the circumstances of this war did develop to a rather marked degree.

The efficiency of the navy must always rest on the attitude of mind of the commissioned personnel to such a degree as to make all other considerations negligible.

It must be thoroughly appreciated that the officers of the navy are the only persons whose interest in the navy is anything more than temporary, since secretaries of the navy come in and go out with the tide of political preferment with all the attendant civilian organization, and the enlisted personnel is eminently transient.

Such being the case, it is to the officers we must look for the vital spark which is to rejuvenate service morale by the necessary tautening up all along the line.

Before beginning with the enlisted personnel it is necessary that we take the necessary measures to ascertain whether slackness does not exist in the officer personnel and eradicate that. Such a procedure must necessarily involve an open discussion of the principles of training which made our officers so remarkably responsive to the almost impossible demands made upon them by our entry into the war.

For years we had been striving to anticipate the requirements of the next war, and had diligently studied methods of foreign services as well as devising new methods of training and organization with an eye single to the improvement of our service and with the star of battle efficiency for point of aim, but always with the knowledge that in all human probability we were falling far short of a truly comprehensive estimate of the situation, which knowledge, however, only acted as a spur to greater endeavor.

The war is over and we now look back on it in an attempt to discover wherein we have failed and wherein we have succeeded in living up to the high ideal of service which has been driving us on for so many years.

A study of the activities of the officer personnel of the regular navy during the war cannot but impress upon one the assurance that, whatever the cause, they measured up to and beyond our most sanguine expectations, spreading their influence over the raw material which was thrust into their hands to use in lieu of the trained men to whom they had been accustomed, in such a manner as to reduce the deleterious effect of lack of training to a negligible quantity.

It therefore becomes evident that our training prior to the outbreak of war was basically right, and our object now should be to return the service to the road it was traveling before the war, with the additional asset of actual war experience to draw upon for improvement.

The proportion of officers of age and experience is not nearly the same as it was prior to the war when compared to the present total number, this being strikingly brought out by the recent general order making the Class of Eighteen eligible for promotion to the rank of senior lieutenant. Prior to the war the Class of Eighteen would now be beginning the last year of the ensigns' cruise, and it would have at least a year or two in the junior lieutenant grade to look forward to before being eligible for promotion to senior lieutenant.

It would seem axiomatic therefore that the training period of officers at sea has practically been done away with by force of circumstances, particularly with regard to those attributes which make the all-round efficient officer and which require, for proper indoctrination, close supervision by the older and more experienced personnel.

In order to rearrange our previously established methods to meet the new condition it will be necessary for us to study and determine just what principles of training of the officer personnel were sufficiently well established prior to the war to have a determining effect upon the standard of ability shown during the war, and which of these principles are now affected by the new condition.

To do this properly it would seem necessary for each of us to go back in our minds to our own beginnings in the service and to decide what conditions and experiences were instrumental in giving us individually the various attributes which we consider had to do with the resultant standard to which we think we measure up.

It must be admitted that we may overestimate our own ability and may think we have attributes which we have not, but that should not prevent us from knowing the parts of our early service life which tended to give us the attributes which we think we have and which we know are the attributes which make for efficiency in the naval officer.

There will of course be differences of opinion as to what these high lights in the character of an officer should be, but a starting point must be had, and the list below expresses as nearly as the writer can his opinion of the most important of those qualities:

(a) Broadmindedness.
(b) Zeal.
(c) Intelligence.
(d) Ingrained sense of duty.
(e) Willingness to accept responsibility.
(f) Knowledge of proper use of authority.
(g) Fairness.
(h) Good judgment.
(i) Decision.
(j) Sympathetic understanding.
(k) Technical qualifications.

Many of the above attributes are so closely related that it may seem there is some repetition in the list, but it is believed that they are sufficiently different in spite of their close relation to make it necessary to maintain their separation. No attempt has been made to mention them in order of their importance, and in truth they all seem so essential as to preclude any such arrangement.

Broadmindedness is essentially a product of age, experience and proper association. No young person is broad minded, but on the contrary all young persons are inclined to be intolerant, hypercritical, and more or less self-sufficient and dictatorial when freed from the curb of superior authority.

Our younger personnel have an added incentive to make them tend toward the ultimate in all the above characteristics in that they are chosen men who have been put through a grind such as no other students in the country except those at West Point have to go through and they distinctly feel themselves to be the "survivors of the fittest" and this gives them, or tends to give them, a "wiser than thou" attitude when thrown with the common herd.

Formerly we have had a remedy for this particular ill in the subordination of the junior officer on board ship.

In the old passed midshipman days when the naval babe was not born with a commission in his hand, springing a full-fledged officer from the foam and froth of an academic education, we had quite an opportunity to apply the hypodermic of disillusionment to this inflated self-esteem, but since that period we have had increasingly less of such opportunity, until to-day we have practically none, and what little we do have is lost in the confusion wrought in our simple sailor mind by the blaze of gold on the sleeve of the infant.

One becomes more and more tolerant as the years accumulate on his shoulders, but only when one is thrown closely with his fellows under supervision, since tolerance is the result of age and properly controlled association, a wearing away of the sharp points by rubbing against those of his brethren, and shipboard is the ideal place for that process, *when proper subordination is expected and required of youth.*

The first two years at sea in the life of the young officer have more to do with his ultimate efficiency than is generally realized, for it is there that a true subordination and a strict sense of duty can be instilled, and must be if the officer is ever to attain his maximum efficiency in the service, and it is a far simpler thing to effect this with one who is still on probation than with one who has passed the probationary period and whose place in the service is practically assured.

It would appear to be possible to effect this by relegating the newly made ensign to the old subordinate position of the passed midshipman during his first two years, but it is not so simple as it looks, due partly to the assured position in the service conferred by the commission, and partly to an inherent service feeling that a commission stands for certain rights and status to which the old passed midshipman never dared aspire, and regardless of how intangible this service feeling may be, yet it has a concrete effect on the attitude of the older officers, and a resultant deleterious effect on the young.

In addition to the above we have the old requirement of three years as ensign discarded and the young men who should just be passing their final examinations for a commission now receiving their commissions as senior lieutenants. That, it is conceded, is a condition brought on by the war, but all our energies must be bent toward the proper training of these officers of relatively exalted rank when compared to old standards, so that the effect of rank may not have a permanently ill effect upon them.

In all fairness it must be appreciated that this not an attack on the younger generation, nor is it an attempt to hold their supposed deficiencies up to ridicule, but it is simply an expression of opinion as to the effect on the service of certain conditions which are different from conditions before the war, with no question of their necessity at the time, but a great question at the present time as to the effect of their continuance.

The first principle of the old training of the passed midshipman was that he was a subordinate for training. All his activities were supervised and passed upon by the senior officers, and this in no casual manner but with the greatest interest and care.

The generally accepted method of accomplishing this supervision was to assign each midshipman to duty as junior officer of a division, and, as far as possible, have all his duties in association with his divisional officer, thus giving that officer a feeling of responsibility for his midshipman and making a community of interest between the officer and the midshipman, which assisted greatly in educating the latter in all those things of character which cannot be taught from books, but which are so large a part of a naval officer's equipment.

To-day we have practically none of such association since the midshipman is gone and we have instead a young man with a

commission in his hand and already established in the service. A young man to whom the wardroom is not more sacred than the steerage and to whom entry into the cabin is no longer a matter to quicken the pulse.

The respect and admiration of the midshipman for the senior watch has long since passed and with it one of the most potent influences in character forming and one for which we have no proper substitute.

The insidious effect of the above condition is very strongly shown by the attitude of the younger officers toward civilians, in that the youngster presumes on his uniform much more than is proper and much more than has heretofore been the case. Several distressing incidents in the above regard have occurred recently in which the officer has shown very markedly that he considered his uniform absolved him from the necessity of ordinary politeness, thus showing a total lack of appreciation of the responsibility imposed by the uniform, both as to conduct and to all the other attributes essential to the gentleman and the officer.

It may well be that the incidents which have come to the attention of the writer are not so indicative of a condition as they appear, but the point at issue is whether the present condition in the service does not tend to increase the liability of such incidents.

Any officer who maintains or attempts to maintain his position in the particular community in which he may be temporarily located, by presuming on his uniform, is not an officer whom the service can afford to retain, since he lacks the instinctive element of gentleness which no other trait can replace. By proper association with his seniors in the service the instinct may be planted in the youth where it has not been before, and can be made to grow where it has lain dormant.

On board ship the life of the young officer for the first two years should be considered one of training, not only by the senior officers but by the young officer himself, and the attitude of the older officers should at all times be such as to impress this on the younger mind, not in a humiliating manner but in a way to cause the youngster to see the necessity of such training.

As stated above, broadmindedness is a product of age and proper association and experience and while age arrives without our interference we must arrange for the last two requirements.

There is no doubt that it lies within our power to provide these elements of training *if we set about doing it in a systematic manner* with a complete appreciation of the condition as it exists. We must therefore set ourselves the task of deciding just what kinds of service employment and what kind of supervision are necessary to accomplish the desired result. We eliminate immediately all shore stations and the sea adjuncts of shore stations as possible places for the training of the newly graduated youngster. These are no places for the young officer to learn any of the lessons of importance in the building of proper naval character.

The things which the young man must now learn cannot be taken from books but must be arrived at by absorption from the seniors surrounding him, and he will absorb little unless those seniors take a sympathetic interest in his training, and this they can properly do only where there are sufficient officers to make it unnecessary to give unsupervised authority. Authority he must be given but it must be supervised in order that he may be held up to the proper appreciation of the responsibility attaching to such authority.

This definitely places him in the large ships of the battle fleets for his first training at sea, but even this will not suffice unless his goings and comings are thoroughly supervised and his duty requirements are made as immutable as the laws of the Medes and Persians.

Personal convenience, desires and interests are the enemies of a true sense of duty and these are usually well intrenched by the time training in a sense of duty can be properly said to begin, because it must be admitted that nothing more than the most elementary start in this training can be accomplished at the Naval Academy. This statement will not be received with favor without some explanation.

The Naval Academy is a school, and, as is true of all schools where the students live entirely within the academic limits, the atmosphere will in many ways be artificial. This artificiality is particularly present in the method used to grade the midshipmen and give them standing relative to their fellows.

For this purpose every part of their work is passed upon and a definite mark of proficiency assigned which not only places them in their class but determines whether they may remain in the academy. The passing mark, the 2.5, then becomes the alpha and

omega of the desires and ambitions of approximately half the class, while class standing, determined by these marks, becomes the objective of those better fitted by reason of greater intelligence, better previous training, or greater ability in the assimilation of knowledge from books.

As a result everything in the midshipman's mind revolves around the 2.5 or class standing and the question of the usefulness of what he is being taught as it touches his future life in the navy seldom enters his head. This is as true of discipline as of any other study.

In addition to the above, until quite recently, there was no system in the application of discipline at the academy. Each discipline officer applied discipline in his own way and the result was so confusing to the midshipman mind that he gave up hope of understanding it and wormed his way through the maze of orders and requirements in the manner of least trouble to himself, and left the further thrashing out of the reasons why until some future time.

In the old days when the midshipman body was small enough to permit closer association with the officer instructor, socially as well as officially, it was possible to teach the midshipmen by example to a much greater extent than is possible at present when the number in each class is so great as to make it problematical whether the individual midshipman really knows all his own classmates.

To borrow a term from our friends the Boche, " Mass Psychosis " will always tend to prevent a proper grounding in discipline and sense of duty in the midshipman at the academy so long as the officers are so few as compared to the numbers of midshipmen and we must therefore recognize the necessity of such training under supervision during the first cruise of these young men in the fleet.

Much criticism is always being levelled at the academy for this circumstance but the greater part of it is unfair on account of conditions shown above and also because there are always some elements of training which require post graduate course, and training in sense of duty is distinctly one of these, and the fleet is the school for this, although it must be pointed out that the more the Naval Academy establishes systematic disciplinary training at the

time when the youth is most impressionable the less there will be for the fleet to do later.

There can be no question that, from time immemorial, there has been far too much unsystematic changing of the methods of teaching and applying discipline at the academy. Each new régime has more or less disrupted the methods in this regard, and, since régimes change about once in three years, and the junior positions are constantly changing, the poor young aspirant to naval honors has had quite a time keeping his sails trimmed to the wind, and frequently gets "caught aback" without knowing exactly why. To be more specific, we will take the subject of the relation of the first class to the other classes. This has run the full gamut from complete control to no control, the limit being reached when a first classman was liable to court martial if he attempted to correct a plebe in any manner.

Common sense should suggest that the present rule of commissioning midshipmen direct from the academy makes it absolutely essential that the first classman have training in handling subordinates to the greatest extent possible, and it should not be such a difficult thing to establish for all time the amount of control which is wise and necessary to give to the first classman in order to give him this training and, at the same time, hold him up to the responsibilities which go hand in hand with such authority. *It is in holding him up to his responsibilities and in making him feel them that proper training in a sense of duty and relations to subordinates comes,* and it is impossible to get this at the academy by any system which does not require control of the lower classes by the first class.

As it is at the academy so it is at sea. Authority under proper supervision engenders responsibilities which teach a sense of duty while authority without supervision breeds rather than diminishes tendencies to dictatorial and intolerant methods in handling subordinates, encourages bullyism, and altogether is far worse than keeping the youngster too subordinate; but there is a happy mean which just answers our purposes and which is perfectly applicable to shipboard life, especially now that the executive has a first lieutenant to take off his hands nearly all of the details of duty with regard to the condition of the ship materially.

The executive has now time to spend in supervising the training of the young officer under his control, to lay out his duties,

designate the limits of his authority, and above all to hold him up to the responsibilities engendered by the authority given him.

Perhaps the executives are doing this now; perhaps they are not. Probably some are and some are not, but, regardless of what is, there can be no question as to what should be, and what can be, if it is taken hold of promptly by the whole service.

A strong belief exists that, for a term of years at least, there can be no more important duty for the executive, and it might not be amiss for the service to judge the ability of the executives by the kind of young officer they turn out of their ships, and it might be intimated here that it is highly probable that captains too will be judged by the service on some such basis.

It may be objected that this is again making the ship a school to the detriment of battle efficiency, but on the contrary all the things which go to make a ship efficient for battle are the things which can be best used in the training of the young officer in a sense of duty and in the other characteristics which go to make up the proper officer.

In the writer's own case the executive was by far the strongest force in the training of the midshipmen.

An indefatigable worker himself, he saw to it that there was no lack of proper work for the midshipman. Duty once arranged was as inexorable as death and the income tax. Night and day, winter and summer, week in and week out, a watch in four, with the relief doing boat duty when in port, which meant the market boat in the morning through to the 1 a. m. boat from the Tomkinsville landing. While we rested we worked in our turrets, made out clothing lists, posted up our note books, growled at the first luff, and when all this was done, and not before, we hit the beach for an evening when in port.

We thought we were discontented, but we were not; overworked, but we were not; doing a lot of useless things, but we were not, since sponges could not have absorbed water at a greater rate than we absorbed the idea that duty was first; that the customs of the service required this and that; that signals were not signals unless smartly sent, received, and executed; that the proper handling of a small boat may bring intense satisfaction both to the handler and to the spectator, and that nothing adds more to the reputation of a ship than smart boats. In fine, that every duty

was important when properly done, both for its immediate effect and on account of the training it gave.

Our grasping the significance of all this was, it is true, much delayed, but we were using the experience thus gained long before we really began to realize its true importance.

He taught us all the things of character laid out in the list above. He was all of them himself and steadily impressed them on us. It is true we did not absorb all of them in full measure because all human beings are not endowed with sufficient soil for such a multitude of seeds to grow in, but within our limitations we got from him all we were able to contain and have been running on that foundation ever since.

From the fleet, as represented by the large ships, the young men should go to the destroyers, and to other small craft, and here we have another suggestion. The approach to the destroyers should be made through the small cruisers and gunboats rather than direct, as a more gradual change from the kind of discipline and duties on the battleship to the comparative freedom of the destroyer; but destroyer work they must have and it would appear that six months to a year in the small cruiser or gunboat would be sufficient, and the only drawback to that would be the objection that too frequent changes would have to be made in the cruisers.

On arrival at the dignity of executive of a destroyer, and before becoming eligible for command, the young man should be sent back to the battleships for a tour of duty. This return to the battleships is just as vital and will be just as prolific of good as any other part of the programme for the following reasons:

All the characteristics mentioned in the beginning of this paper with the exception of "technical qualifications" are dependent on the total routing out of intolerance, arrogance, dictatorial attitude and self-sufficiency. Age alone will not cure these defects and it requires the proper experience and association with those who have been through all the varying stages and who may be termed the post graduates of the system.

In addition, it requires a renewed appreciation of the more formal side of service life as represented in the battleship, a getting back to the more dignified atmosphere, if it may be so expressed, in order to complete and fix in mind for all time a proper service perspective.

In the destroyers the restraining hand of age and experience is to a certain extent lacking, since all the personnel is young, and he who passes through all the stages and becomes commanding officer without going back to the battleships will have a distorted perspective, and will still retain some of the seeds of intolerance which will be more firmly fixed in his character by the authority of command.

There is not any training in the service more prolific of good than the destroyer training, when properly applied, and, conversely, there is none more dangerous, when carelessly applied.

Just how long the young man should remain in the battleship this second tour is largely dependent on the individual. Any young man who shows that the strict discipline and routine of the battle fleet is irksome to him should not be sent back to the boats until all that has been routed out, while the one who shows a proper appreciation of such discipline and routine may be sent back at any time.

Is it too much to say that in the above lies our greatest present problem? Is it too much to hope that the service individually and collectively will seriously consider this question paramount and address itself to the solution with all the enthusiasm and seriousness of which it is capable? Is it too much to suggest that the Personnel Bureau consider this question when gazetting executives to ships, in order that those best fitted by their known characteristics may have proper field for their use?

Would it be amiss to suggest that the Naval Academy institute a series of lectures to enhance service interest among the midshipmen, and that the lecturers be drawn, not from the ranks of the clergy, the Y. M. C. A., or allied interests, but from the fleet, which is the service? That these lectures be not on professional technique, but on the service, its customs, its importance in the national scheme, its honorable place in the nation's history, and, above all, on that indefinable something which lifts it above greed, avarice, self-seeking, all commerciality, and makes us glad to take as our reward for services rendered the approbation of our cloth—in other words the soul of the service?

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A PRACTICAL TEST OF RADIO COMPASS SHORE STATIONS

By LIEUTENANT HAROLD O'D. HUNTER, U. S. Navy

An experimental comparison of the course of destroyer *Charles Ausburn* as determined by the usual navigational instruments and by radio was made on July 9, 1920, in connection with the calibration of the Radio Compass Stations at Hog Island, Va., and Cape Henry, Va. This test was made at the entrance to Chesapeake Bay over a course of about 30 miles, the object being to ascertain the relative accuracy which may be expected from the Chesapeake entrance group of radio compass stations.

The conditions of the test were as follows:

(a) *Charles Ausburn* to take a position at least 25 miles from Cape Henry Compass Station and to fix its position exactly by navigational instruments.

(b) *Charles Ausburn* at position (a) to transmit by radio for 3 minutes on 800 meters.

(c) *Charles Ausburn* to proceed for 15 minutes on any course, obtaining position at end of this period, and to transmit for period of 3 minutes.

(d) *Charles Ausburn* to repeat above procedure until advised by compass control station to discontinue tests.

The calibrating party was stationed at the Cape Henry Compass Station. Six readings were taken on the ship at each fifteen-minute fix. The average of these readings was taken in connection with the average of six taken by the Hog Island Compass Station in determining the ship's position by radio by the usual triangulation process.

The Hog Island bearings were extremely difficult due to the slight angular changes between fixes, since the course of the ship was directly away from the Hog Island Station. Hog Island

was further handicapped by having to work without a compensator and with a minimum relatively broad.

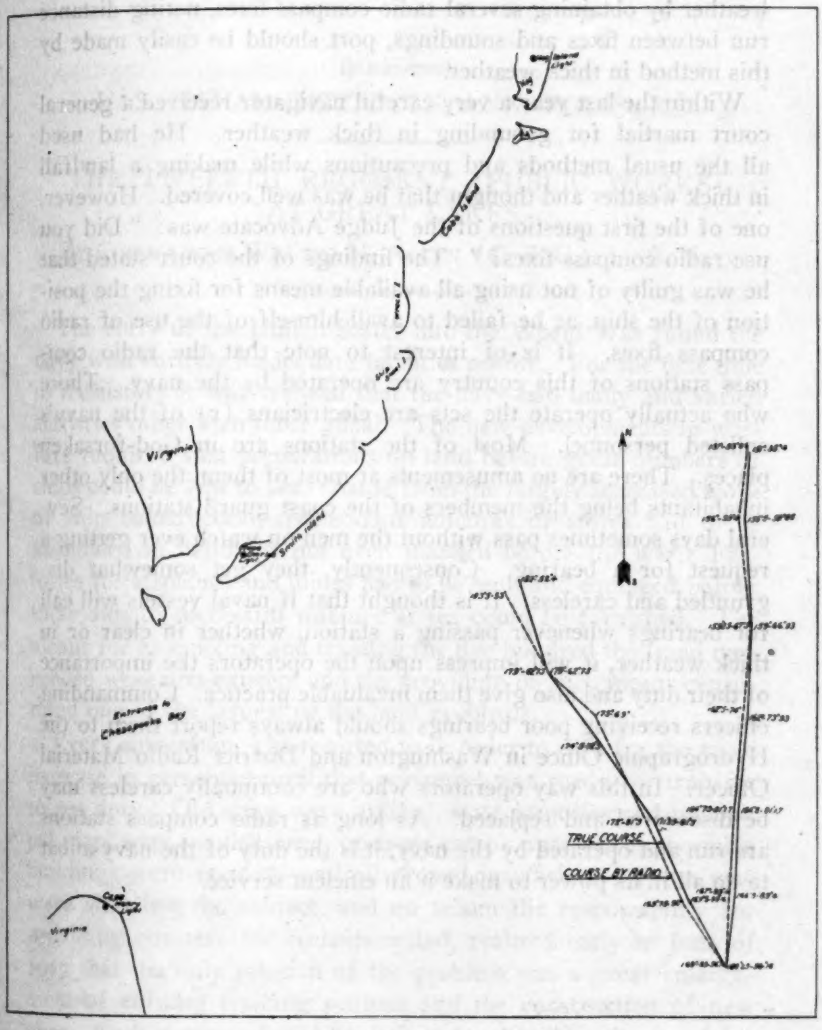
All navigational fixes of the *Charles Ausburn* were carefully computed by the author and plotted. Then the true bearings of both Cape Henry and Hog Island were taken from the largest scale chart available. The comparative bearings are shown in the tabulation below.

TABULATION OF BEARINGS

Ship's bearing by Cape Henry radio compass	True bearing Cape Henry from ship's fix	Ship's bearing by Hog Island radio compass	True bearing Hog Island from ship's fix
55.24°	55.4°	151°	151°
59.4	59.66	156	155.5
67.5	66.93	159.25	159
74	73.93	162.5	162
81.17	81.17	164.75	164.5
89.4	89.4	167	166.5
96.16	96.16	168.25	168.25
90	89.16	169.75	169.5
81.5	81.5	172	171.25
69	72.5	175	174.5
62.75	62.75	179	179
53	52.4	183.5	182

The above tabulation shows the actual results that may be obtained from shore radio compass stations. The maximum error in any bearing is 2.5° and the average is less than a degree. The photo print Sheet 5A of U. S. Coast and Geodetic Survey Chart No. 122 upon which has been traced the ship's course as found by both radio and navigational methods is of interest as indicative of the utility of the ether-wave method of navigation.

It is to be noted that the maximum error between the ether and navigational fixes is 1.25 miles and the average error is about a quarter of a mile. Of course as a ship gets nearer a station the more accurate will be the bearings. This experiment is merely a confirmation of the radio compass service daily being extended to shipping by the Chesapeake entrance compass group, and in view of the possibility of some error in fixing accurately the ship's position by navigational instruments when drifting and under the influence of strong tide it is considered that equal care will produce equal precision whether by visual or by ether method. Since the visual method is out of question in thick weather the ship may still proceed with entire reliance by the positions flashed


Virginia
Entrance to Chesapeake Bay
TRUE COURSE
COURSE BY RADIO

to it through the ether. The careful navigator would not place complete reliance in one fix by either method. However, in thick weather by obtaining several radio compass fixes, noting distance run between fixes and soundings, port should be easily made by this method in thick weather.

Within the last year a very careful navigator received a general court martial for grounding in thick weather. He had used all the usual methods and precautions while making a landfall in thick weather and thought that he was well covered. However, one of the first questions of the Judge Advocate was: "Did you use radio compass fixes?" The findings of the court stated that he was guilty of not using all available means for fixing the position of the ship, as he failed to avail himself of the use of radio compass fixes. It is of interest to note that the radio compass stations of this country are operated by the navy. Those who actually operate the sets are electricians (r) of the navy's enlisted personnel. Most of the stations are in God-forsaken places. There are no amusements at most of them, the only other inhabitants being the members of the coast guard stations. Several days sometimes pass without the men on watch ever getting a request for a bearing. Consequently, they get somewhat disgruntled and careless. It is thought that if naval vessels will call for bearings whenever passing a station, whether in clear or in thick weather, it will impress upon the operators the importance of their duty and also give them invaluable practice. Commanding officers receiving poor bearings should always report them to the Hydrographic Office in Washington and District Radio Material Officer. In this way operators who are continually careless may be discovered and replaced. As long as radio compass stations are run and operated by the navy, it is the duty of the navy afloat to do all in its power to make it an efficient service.

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THE TWELFTH REGIMENT (PUBLIC WORKS) AT GREAT LAKES

By COMMANDER WALTER H. ALLEN (C. E. C.), U. S. Navy

The entry of the United States into the World War found the navy with entirely inadequate facilities ashore. For the first time in its history it was realized that the navy had many and varied activities other than those afloat. The new developments in warfare required vast preparations on land before great numbers of ships could be sent to sea. Aside from the largely increased work of ship construction, tremendous amounts of stores had to be assembled in buildings not even planned before the war. Factories for airplanes and mines had to be built and equipped before these aids to successful warfare at sea could be furnished. The means for assembling and training the five hundred thousand men needed were non-existent and the providing of such means constituted one of the largest of the land problems.

Every subterfuge was resorted to in order to care for the rapid increase in personnel until that personnel was ready for transfer to sea duty. Old ships were utilized, state armories and municipal piers were requisitioned, open-air camps were set up, portable buildings were erected—and all proved insufficient. Those who were studying the subject, and on whom the responsibility for providing quarters for recruits rested, realized early in June of 1917 that the only solution of the problem was a great enlargement of existing training stations and the construction of new ones. Such stations should be designed and built with regard for the kind of training to be given there and each fitted for its peculiar work. This expansion was definitely started in June, and during the summer of 1917 there was great activity in camp construction for the navy. But the demands of the navy afloat and

overseas, and the manning of merchant ships, caused a constantly increasing flow of recruits to the training stations. The beginning of 1918 showed that the new camps were still far too small to fulfil their purpose, and the following spring and summer, and even until hostilities ceased, camps were being enlarged and perfected with all possible speed.

Before the World War, few people in the United States had ever heard of the Naval Training Station at Great Lakes, Illinois. It was little known to the personnel of the navy itself. Situated near the center of the country and far removed from the coasts, naval officers seldom visited it unless official business required them to go there. The number of enlisted men who had been trained at Great Lakes was comparatively small.

All this was changed by the expansion of the navy during the war. The Mississippi Valley was found to be a splendid field for recruiting and a large proportion of the recruits from this section gained their first knowledge of the navy at Great Lakes. From a population of a few hundred the station grew in a year and a half to a camp of nearly 50,000 men. It was the Mecca for all those ardent spirits in our Central States whose patriotism impelled them into the navy.

Among the many interesting features at the Great Lakes Station during the war was the Public Works Regiment. It was an organization that was little understood by the navy at large. This lack of understanding has been the source of many groundless statements in regard to the work and purpose of the organization. It has been intimated even that this unit was primarily concerned in keeping men away from the fleet, whereas this regiment probably furnished more men, and more trained men, for ship and overseas work than any other regimental organization at any naval training station. It is the object of this paper to show the origin, growth, work accomplished and advantages to the service of the Twelfth Regiment (Public Works) at Great Lakes.

The Naval Training Station at Great Lakes experienced the growth common to the other camps. Tent cities sprang up all around the original station. Open-air mess halls and shanty galleys were improvised to meet immediate demands. Yet the great influx of recruits fairly swamped all facilities. There was an urgent demand for more barracks, mess halls and instruction

buildings, for great increase in the water supply and sewage disposal systems, for buildings for storage of all classes of supplies, for roads and trackage to make the new parts of the station accessible, and for increased hospital facilities to care for patients far greater in number than anyone had ever anticipated.

All these additions were started almost simultaneously, throwing a great burden of work on the Public Works Department of the station. Draftsmen and surveyors had to be found at once, material checkers and work inspectors for contracts were immediately necessary, clerks to keep track of cost accounts on contracts were needed; and to meet these demands with civil service employees was an impossibility. The very best way to meet them was to commission or enlist the personnel for this work. Men most suitable were not desirous of holding civilian positions. The uniform, the opportunity to do their bit as part of the navy and the chance of transfer later to more active war operations, made possible the assembling by the Public Works Officer of a very capable force to handle the new construction.

As camps were completed, power houses put in operation, railroad rolling stock and auto trucks increased in numbers, and other new constructions approached completion, the problem of maintaining and operating the station, with a capacity ten times that of pre-war days, assumed serious proportions. Again the Public Works Officer was called upon to assemble an enlisted force to carry on the operation and maintenance work of the station.

The organization at Great Lakes differed from that at most other training stations in that the Public Works Officer was not only charged with all construction of public work and the providing of all public utilities, but also it was his duty to repair, maintain and operate all these facilities. The organization, decided upon early in the war, had the advantages of centralizing this special work under trained supervisors and of relieving the regular training regiments from work that would only hinder the rapid training of men. It had exactly the same advantages that resulted from having one commissary officer provide and prepare the food for all the regiments and one paymaster handle all the recruit rolls.

Such was the origin of the Public Works force, a force composed largely of technical men, construction specialists and artisans. These men had navy ratings conforming as nearly as

possible to the work that they were doing or to the previous training that they had received. But the emergency that had made their services necessary had prohibited their receiving at first the preliminary rudimentary naval training given to other recruits and many of them carried on their duties in the Public Works Department from the day of enlistment and even while passing through the detention camp. They worked hard, often ten or twelve or fourteen hours each day, and for months some of them had no Sunday or any other liberty.

By December of 1917 this Public Works force comprised nearly a thousand men, a number so large as to require special organization for purposes of housing, muster, pay, discipline and proper distribution to the work. Accordingly this force was organized into the Twelfth Regiment (Public Works) and put upon a basis similar to other regiments of the station. The regiment was under the command of a line officer, assigned by the Public Works Officer from the force under him. This military organization was known as the "Regimental Division" of the Public Works Department and it controlled the whole Public Works force in all military matters. It had its own staff of officers and men purely to perform the regimental duty. The rest of the men in the regiment were assigned for purposes of work to other divisions of the Public Works Department, such as the Contract Division, the Clerical Division, the Projects Division or the Station Labor Division, and reported to these divisions for work each morning. The Regimental Division had no further control of them until their daily work was done. But, except for such day work, the Regimental Division had entire charge. It handled all questions of discipline, liberty, pay, clothing, barracks, messing, recruiting, transfers and drafts; in these matters the heads of other divisions had no jurisdiction, though they consulted freely with the regimental officer and made recommendations to the Public Works Officer in regard to the part of the personnel working under them. This organization of the Public Works Department was not attained in its complete form until the summer of 1918. Minor changes to perfect it were made as found necessary. But the plan instituted in December of 1917 worked smoothly from the start and handled successfully the Public Works force to the end of the war and throughout demobilization, a force that in August of 1918 numbered about six thousand two hundred men.

The Public Works regiment occupied five different camps, and the last one, built for its permanent home, was not completed until after the armistice. But as the great area and long distances of the station made it impracticable to carry on all the work from the main regimental camp, maintenance barracks to hold two or three companies were established in two other parts of the station. For operation and maintenance purposes there was a shop and a public works office located in each regiment and in each was a detail from the Twelfth Regiment. This detail handled all repairs of buildings and of water and heating installations and the operation of power plants within the regiment to which it was assigned.

Some of the new construction done by this regiment was of considerable magnitude. One regimental camp was built and later remodelled and enlarged to a capacity of 2000 men. Two other camps were doubled in size by the construction of detention barracks. The regiment erected one of its own maintenance barracks with a capacity for 450 men with mess halls, galley and power plant. The baseball and football fields and running track were filled in, graded and sodded almost entirely by men of the Twelfth Regiment. They built the grandstand and bleachers, seating fifteen thousand people, in eighteen working days. Small parties under competent junior officers did considerable work at other places in the naval districts, such as the erection of barracks at the St.Clair River Canal. The construction work performed by contractors but supervised by the Public Works force amounted to seventeen million dollars and included all kinds of camp constructions, not only buildings, but power plants, water, sewer, heating and electric distribution systems, installations for water filtration and sewage disposal and roads. With only two or three exceptions all plans and specifications for these works were prepared at Great Lakes.

But construction and maintenance of the station was not by any means the sole function of the Twelfth Regiment. On the contrary, this regiment proved to be the greatest training regiment of the station. If the Navy Department called for a draft of firemen, the draft was filled from those who had been tried out in firing at the many power plants of the station. If carpenter's mates were needed, men found efficient on actual construction work were selected. This same policy was followed in all the regular artificer ratings, for practically all recruits with artificer

experience ashore were assigned to the Public Works Department. There each was tried out, his ability was determined, the examinations for promotion in ratings were conducted and the selections for drafts were made from those found skilled in their ratings. The Training Station was called upon to furnish certain fixed weekly or monthly drafts in the artificer branches. All such drafts were filled from the men in the Public Works Department. Many drafts of men with special qualifications were sent out. Organized surveying parties were sent for work along the Atlantic Coast; draftsmen were sent to the Bureau of Yards and Docks; and inspectors were selected for the construction of the new Navy Department and War Department office buildings in Washington and for construction work at other places.

In March, 1918, the station was called upon to supply 200 men for the construction of aviation stations on the coast of France. Not only were these men supplied but the station informed the Bureau of Navigation that it could furnish from the Public Works Regiment a construction party of four or five hundred men, already trained and experienced in this class of work, together with their chief petty officers and officers—a completely organized construction unit. Three hundred and fifty men from Public Works formed half of a party sent overseas to build and operate an aviation station at Poillac. Many men were selected and sent for the building of the 820 ft. radio towers in France. Perhaps the best known of these special drafts from the Twelfth Regiment was the railroad party that assembled and operated the trains for the fourteen-inch naval guns that did such good work on the battle line in France. In addition to the selection of men from the Public Works Department to fill drafts, the regiment was called upon to select from the whole station men suitable for certain classes of training. It searched all regiments to obtain men to fill the drafts for the listener's school, the oil burner's school, the optical school, the various schools for machinists, and in fact for all such special technical training.

In order to help men to a better understanding of their duties at sea, an artificer's school was started in the Public Works Department under the Regimental Division. This school offered day courses for firemen, machinist's mates, plumbers and fitters, carpenter's mates and electricians. Night courses were given in mathematics, geography and history. In all courses seamanship

was taught. About 800 men were trained in the day courses and night courses gave instruction to more than 2000 men. All attendance was voluntary and in addition to the regular duties.

Meanwhile military instruction was not being neglected. Twice a week after supper drill was held for two hours for all men in the regiment; no liberty was granted until the drill period was over. Every man in the regiment could march and handle his rifle. A course for officers was started, first in rifle, pistol and machine-gun firing and mechanism, and later in larger guns and torpedoes. Though attendance was not compulsory, all officers of the Public Works Department gave two nights a week to this work.

Some of the officers and men taken into the service for special construction work remained with the Public Works Department to the end of the war; many others were transferred to other regiments of the station; a large number of the enlisted men obtained commissions, for the proportion of technical and educated men in the regiment was very high; but aside from all these changes in personnel, the regiment sent from the station for duty in the East, or aboard ship, or for transfer to France, more than 16,000 men, practically all of them skilled in some trade or profession.

This account of the Public Works Regiment would be incomplete without some mention of the characteristics of the regiment. The men averaged several years older than the ordinary recruits. A large part had had several years trade experience before enlistment. Many were married. They were not boys, but men, and this characteristic was particularly noticeable in parades because of their better physique and more mature carriage. They did not appear like a battalion of recruits but as a body of men who had found themselves. They looked businesslike. The spirit in all they did was most commendable. Though they worked long hours and received little liberty, yet at all times, no matter how prosaic and uninspiring the task, they seemed to realize that they, too, were contributing something of value toward ultimate victory. The greater the urgency of the job, the more they seemed to enjoy it. A strong regimental pride and *esprit de corps* developed. The discipline was excellent. The device of the Civil Engineer Corps, which the men wore on the left sleeve, meant to them a standard of work and living that must be kept high.

The Twelfth Regiment (Public Works) at Great Lakes demonstrated certain points worth noting. A brief summary of these points and the lessons to be drawn from them may perhaps be of future value, should a like occasion arise.

The first and most important point demonstrated is the great need of thorough military organization and control of men engaged on such construction and maintenance work. This need was not appreciated while the number of men was small. The great advantages of such organization were not foreseen nor were they half realized until the Regimental Division had demonstrated that by such organization the discipline, welfare and contentment of the men were vastly improved, and the efficiency of the Public Works Department was greatly increased.

Another point clearly brought out was the possibility and great advantage in time of war of doing certain construction and maintenance work with the enlisted force, such work as would ordinarily be done at other times by civil service employees or by contract. The troubles everywhere experienced throughout the United States with civilian employees, especially on contract work, were avoided by using enlisted men. Strikes, demands for increased pay, labor union control and jurisdiction, overtime work, were all eliminated. Concentration of force on the more urgent jobs was easily effected. Even questions of supply of labor and housing were simplified.

No attempt was made to do with the Twelfth Regiment work that might as well be done by contract, but that enlisted personnel can compete successfully with contractor's labor was shown by several works constructed. Some of these constructions would have cost well over the hundred thousand dollar mark. No claim is made that the use of enlisted artisans effects a saving in cost; in fact, construction by civilian force may be cheaper, when the cost of enlisting and caring for naval men is considered. But certainly in time required for construction and in quality of work done, the enlisted force does not suffer by comparison, under war conditions.

If this was true in construction work, it was even more true in the work of maintaining the station, in preparing plans and specifications for new work, in contract inspection, and in much of the clerical work. The quality of the specialists obtained by

enlistment and commission was far superior to any civilian force that could have been brought together through the civil service.

The results obtained in such construction work as was done demonstrated the entire feasibility and perhaps great advantage of having a large part of the construction work of the navy carried on by enlisted force in time of war. If this is true of work within the United States at such a place as Great Lakes, it would be even more true of work to be done in isolated localities or on a foreign shore. The absolute control of the force, the freedom from all labor agitations, the splendid morale as compared with contractor's labor, are points that go far toward gaining efficiency and speed.

The many times that Great Lakes was called upon to furnish construction parties and draftsmen, inspectors and engineers, showed that some provision should be made in any future war for regularly recognized sources from which such men can be obtained. The assembling and training of such a force should receive recognition and careful study. There might well be in the Naval Reserve a corps of technicists enrolled for this special work. These men would be among the first called in a crisis, for it would be their task to prepare the old camps for the influx of the main body of the reserve, or to plan and build the new camps. With such a body of technicists available at the outbreak of war, not alone the camp constructing, but also the maintaining and operating force, many valuable days could be saved in preparing to assemble and train the great body of the enlisted men of the navy.

The supply of skilled mechanics in the section of the country from which Great Lakes received most of its recruits was plentiful and it was not difficult to secure efficient workmen. As only tried artisans were sent on drafts, there was a saving in training of poor mechanics, and an assurance of the ability of men to do the work required in their ratings, and that the rating of each man was in accordance with his ability. The amount of weeding out aboard ship was reduced because it was possible to give a thorough tryout on land. Money and time were not wasted in transporting poor mechanics; and in the process of selecting qualified men much productive work was done.

The close of the war was the signal for the rapid decline and ultimate complete elimination of the Public Works Regiment.

The cessation of camp construction and the reduction of the station personnel made possible a quick demobilization of this force. Civilian personnel took the place of officers and enlisted men. In a few months the regiment ceased to exist. It had done its work. It had no place in a peace organization. Its record of accomplishment remains as a proud memory for those whose names were enrolled on the roster of the Twelfth Regiment (Public Works) at Great Lakes.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE ORIGIN OF GROG

By COLONEL G. C. THORPE, U. S. M. C.

Grog was a gallant hero before it was a drink.

Admiral Edward Vernon of the British Navy rendered distinguished service in the Baltic, West Indies and the Mediterranean, and was honored by Queen Anne when he returned from the capture of Gibraltar. During a period of quiet in British military affairs he entered politics and as a member of Parliament participated in debates demanding energetic emprise against Spain. He was accused of speaking extravagantly. He assailed the government with severe invectives for its peaceful strategy and in a blaze of enthusiasm declared that *he* could take Porto Bello, the great Spanish stronghold in Panama, with a squadron of six ships. The government retaliated upon its critic by sending him out as commander of the West Indian fleet composed of the force that he himself had said was sufficient. As it turned out, Porto Bello had come by evil days and its defense was far less prepared than was expected in England, for the castle and city surrendered to Vernon on the second day of the attack—with small British casualties. When the news of the victory reached England, there was the wildest enthusiasm; Vernon was not only the "hero of the hour" but the hero of years; a year later his birthday was celebrated by the public illumination of London, and more than three years after the victory of Porto Bello, two disastrous campaigns intervening, he received the freedom of the city of London when he returned to England.

The admiral was in the habit of walking the deck of his flagship in a rough boat cloak called a *grogram;* as it was a peculiar garment it suggested a nickname for the popular flag officer and Admiral Vernon came to be known affectionately as *Old Grog.*

Shortly after the surrender of Porto Bello, the admiral introduced West Indian rum aboard ship and had a mixture of rum

and water served as a ration to the crews. It was intended as a preventive against fevers that had decimated so many European expeditions to the West Indies. When the sailors of the flagship *Burford* first tasted the new drink they found it most palatable, and as the enthusiasm of victory still ran high they named their favorite beverage after their favorite commander. Forty years later some verses were composed on the cruiser *Berwick* on the eve of Admiral Parker's fight with the Dutch fleet (1781) which bespeak the popularity of the man and the drink a quarter of a century after the man was dead. Here are the last two of the seven verses:

A mighty bowl on deck he drew,
And filled it to the brink;
Such drank the *Burford's* gallant crew,
And such the gods shall drink.

The sacred robe which Vernon wore
Was drenched within the same;
And hence his virtues guard our shore,
And *Grog* derives its name.

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THE MYSTERY OF THE LINE OF BEARING

By Rear Admiral G. H. Burrage, U. S. Navy

One of the troubles of the officer of the deck in formation is to understand the fundamental principle of getting into position in line of bearing and when out of position what to do to get back.

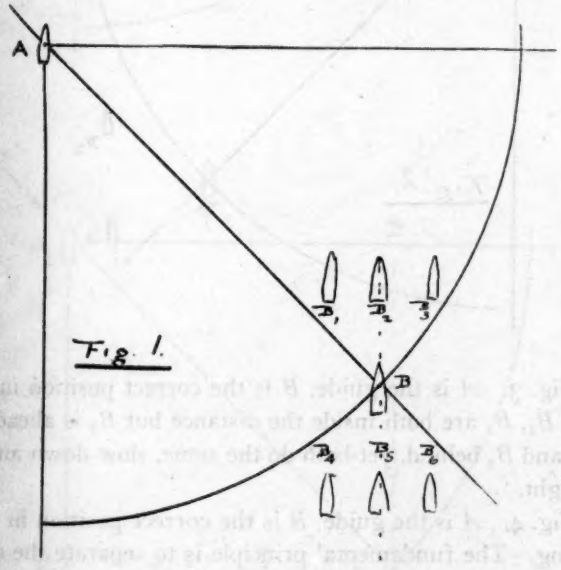


Fig. 1.

See Fig. 1. A is the guide, B is the correct position in line of bearing. B_1, B_2 and B_3 are positions inside the distance and ahead of the bearing, which is all the information the officer of the deck is given. Each case has to be handled differently. All slow down but B_1 shears to right, B_2 keeps her course, B_3 sheers to left.

B_4, B_5 and B_6 are positions outside of the distance and behind the line of bearing and like the above, the solution differs in each case. All increase speed—B_4 sheers to right, B_5 keeps her course, B_6 sheers to left.

See Fig. 2. *A* is the guide, *B* is the correct position in the line of bearing. B_1 and B_2 are outside the distance and ahead of the bearing. Both sheer to the left, but B_1 has to speed up and B_2 slow down.

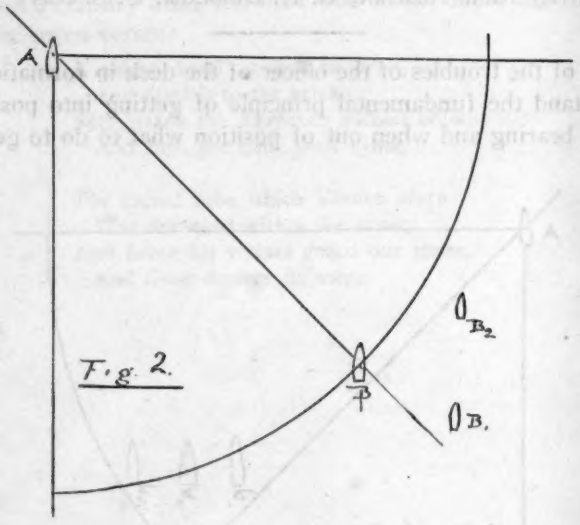


Fig. 2.

See Fig. 3. *A* is the guide, *B* is the correct position in line of bearing, B_1, B_2 are both inside the distance but B_1 is ahead of the bearing and B_2 behind, yet both do the same, slow down and sheer to the right.

See Fig. 4. *A* is the guide, *B* is the correct position in the line of bearing. The fundamental principle is to separate the distance and bearing from the guide into its component parts at right angles (*B-C*) and parallel (*B-D*) to the course of the guide. By keeping the distance *B-C* approximately correct, then it is simply a question of changes of revolutions to keep position; in other words, first keep on the line *B-D*, then correct bearing by slowing or increasing speed.

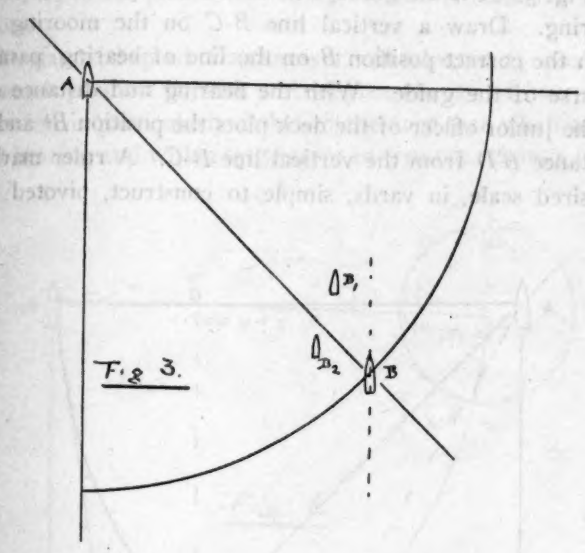


Fig. 3.

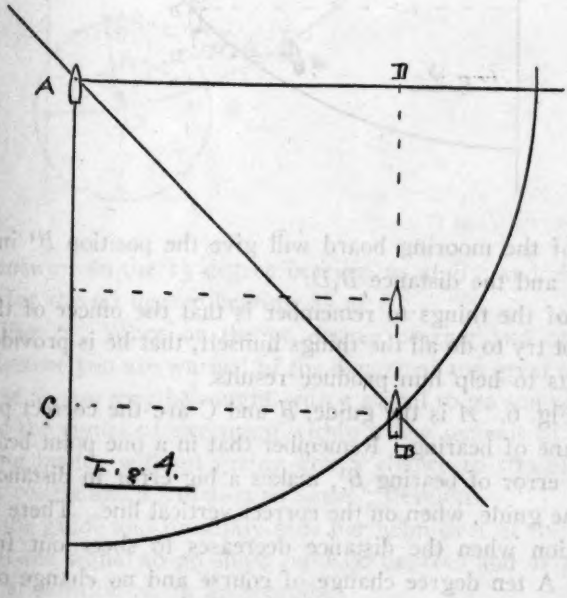
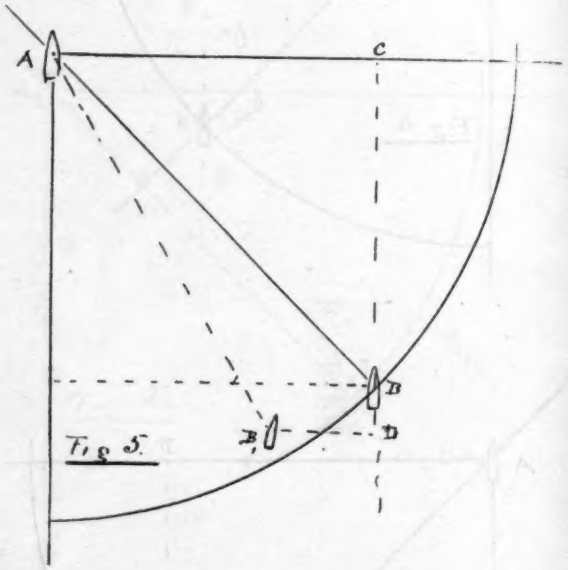


Fig. 4.

See Fig. 5. *A* is the guide, *B* is the correct position in the line of bearing. Draw a vertical line *B-C* on the mooring board through the correct position *B* on the line of bearing, parallel to the course of the guide. With the bearing and distance of the guide the junior officer of the deck plots the position B^1 and gives the distance B^1D from the vertical line *B-C*. A ruler marked to the desired scale, in yards, simple to construct, pivoted in the



center of the mooring board will give the position B^1 in a few seconds and the distance B_1D.

One of the things to remember is that the officer of the deck must not try to do all the things himself, that he is provided with assistants to help him produce results.

See Fig. 6. *A* is the guide, *B* and C are the correct positions in the line of bearing. Remember that in a one point bearing *B*, a small error of bearing B^1, makes a big error in distance, B^1A, from the guide, when on the correct vertical line. There is great temptation when the distance decreases to sheer out from the guide. A ten degree change of course and no change of speed

will land B_1 in the position B_2 in 4½ minutes if standard speed is 10 knots.

If the standard speed is 20 knots it will take but 2¼ minutes for B_1 to reach position B_2 with a 10 degree change of course.

Attention is particularly called to the fact that when near the correct bearing and with a large error in distance; change in speed

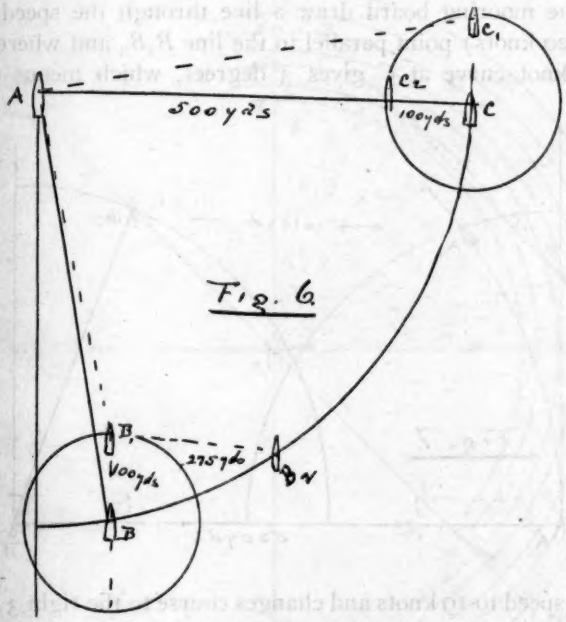


Fig. 6

is the answer, on the 15 degree bearing, as at B_1; and change in course for the 90 degree bearing as at C_2.

See Fig. 7. When on the 90 degree bearing and correcting your distance you are warned of the danger of too great a change in course as you may be caught with a signal to go ships right or left and the signal of execution within a few seconds of the signal being made; without giving you a chance to straighten out on your course and a situation as figure 7 develops.

A is the guide and promptly puts her helm over at the hauling down of the signal to go ships right 90 degrees and at 15 knots arrives at position A_1 in 40 seconds.

B has been closing in at 20 degrees change in course and reaches position B_1 before beginning to turn.

Not only a risk of collision between *A* and *B* but *B* will find herself very much out of position.

See Fig. 8. An interesting study of how to change position B_1 to B_2 and remain on the line of bearing, AB_1B_2.

Speed of guide, *A*, 20 knots.

On the mooring board draw a line through the speed of the guide (20 knots) point parallel to the line B_1B_2 and where it cuts the 19 knot curve at *C* gives 3 degrees, which means that B_1

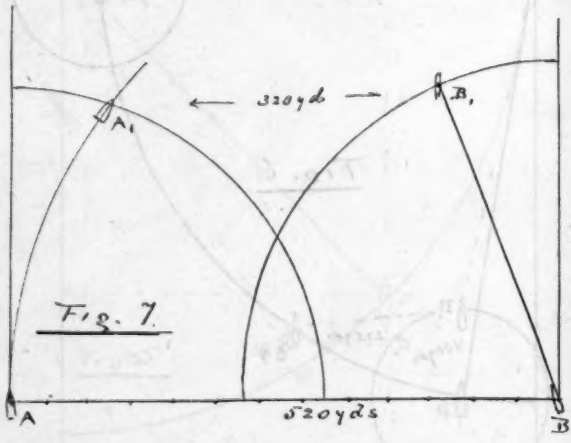


Fig. 7.

reduces speed to 19 knots and changes course to the right 3 degrees to keep on the line of bearing AB_1B_2.

The following table gives the change of course for different speeds taken from Fig. 8:

Line cuts	19 knot circle at	C	gives	3	degrees change of course	
	18 " " "	D	"	6½	" " " "	
	17 " " "	E	"	11½	" " " "	
	16 " " "	F	"	17	" " " "	
	15 " " "	G	"	25	" " " "	
(Slowest speed possible)	14 2/10 " "	H	"	45	" " " "	
	20 knot circle at	B_2	"	90	" " " "	

In deciding upon what change of course and consequent change of speed to go from one position to another, due regard must be

had for the distance to be gained from right or left of your present position.

For example, see Fig. 8. To go from B_1 to B_2 or anywhere on that line of bearing where the line parallel to the line B_1B_2 cuts the speed of the guide at A (20 knots) gives 90 degrees, but manifestly if you were to gain 100 yards to the right you would not attempt to turn 90 degrees and steam 20 knots but you would do it if you had to gain 5000 yards.

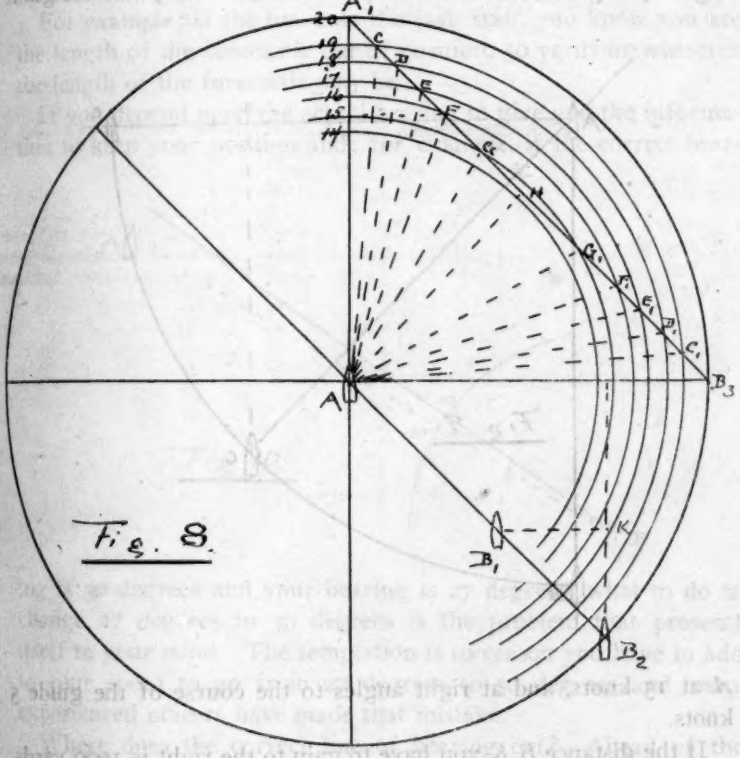


Fig. 8.

The speed at right angles to the course of the guide is obtained as follows:

See Fig. 8. Take for example, you have decided to slow down to 16 knots. You find the 16 knot circle cuts the line $A_1 B_3$, which

is parallel to the line B_1B_2 through the point A_1, the speed of the guide, at F which gives a change of course of 17 degrees. Resolve the speed A-F parallel to the *course* of the guide A_{15} and at right angles to the course of the guide F-15 and the length of the line F-15 measured on the scale of knots gives 5 knots, which means that when B_1 slows down to 16 knots, changes course to the right 17 degrees, she advances parallel to the course of the guide

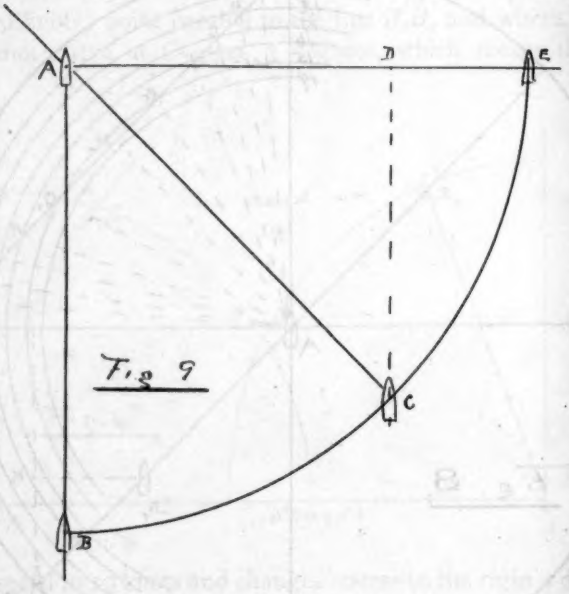


Fig 9

A at 15 knots, and at right angles to the course of the guide 5 knots.

If the distance B_1K you have to gain to the right is 1000 yards, you go in the direction B_1K at the speed of 5 knots, or 500 yards in three minutes, 1000 yards in six minutes.

All of this information is obtained from the mooring board.

See Fig. 9. A is the guide. Remember in changing from a stern B, to a 45 degree bearing, C, the distance A-D has to be gained to the right but the changing from a 45 degree bearing, C, to a beam bearing, E, the same number of degrees as before, only the distance D-E has to be gained.

See Fig. 10. When keeping position in line of bearing, set the pelorus for the correct bearing, *B-30,* and watch if the correct bearing is moving ahead or astern. If moving ahead then to bring the line back on the guide, slow down.

It is important to keep to this method, as it not only tells what is to be done to regain position but gives an estimate of how many yards out of position you are.

For example; if the line cuts the jack staff, you know you are the length of the forecastle out of position, 50 yards or whatever the length of the forecastle may be.

If you depend upon the actual bearing to give you the information to keep your position and; for example, if the correct bear-

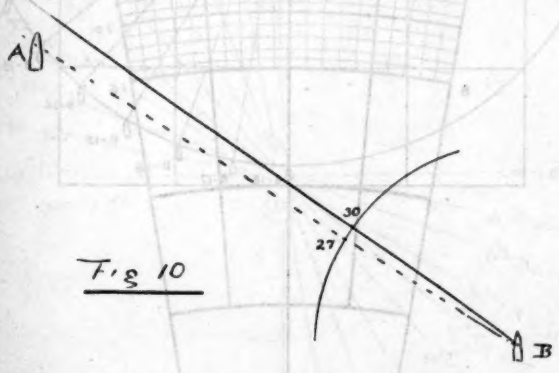


Fig 10

ing is 30 degrees and your bearing is 27 degrees, what to do to change 27 degrees to 30 degrees is the problem that presents itself to your mind. The temptation is to reason you have to add to your speed to go from 27 degrees to 30 degrees and many experienced officers have made that mistake.

Where does the correct line of bearing cut? Ahead of the guide brings the direct reasoning, slow down to bring the line back on the guide.

Fig. 11, a section of the mooring board, is constructed on the same principle as shown in Fig. 8, for every 10 degree line of bearing and the results tabulated. For 10 knot standard speed one knot maximum change in speed, 10 degree maximum change of course in Fig. 12.

For 20 knot standard speed, 2 knot maximum change in speed, 5 degree maximum change of course, in Fig. 13.

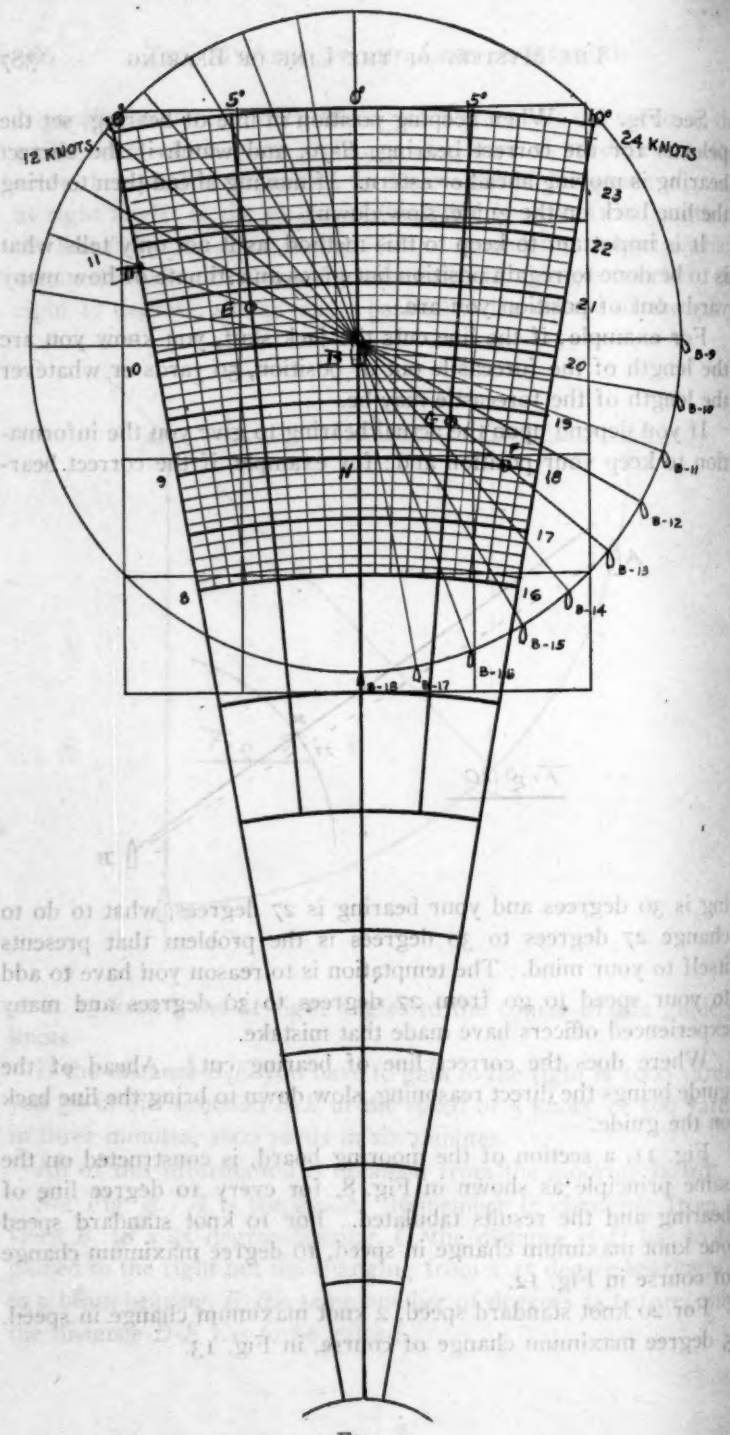

12 KNOTS
24 KNOTS
5°
5°
10°
23
22
21
20
19
18
17
16
11
10
9
8
B-9
B-10
B-11
B-12
B-13
B-14
B-15
B-16
B-17
B-18

FIG. 11.

The method of using Fig. 11. To go from *B-11* to *B*, using not more than 10 degree change in course with 10 knot standard speed. The line *B-11 B* if extended cuts the 10 degree radius at *D* which is on the 10 9/10 knot circle; which means for a change of course of 10 degrees a change of speed to 10 9/10 knots.

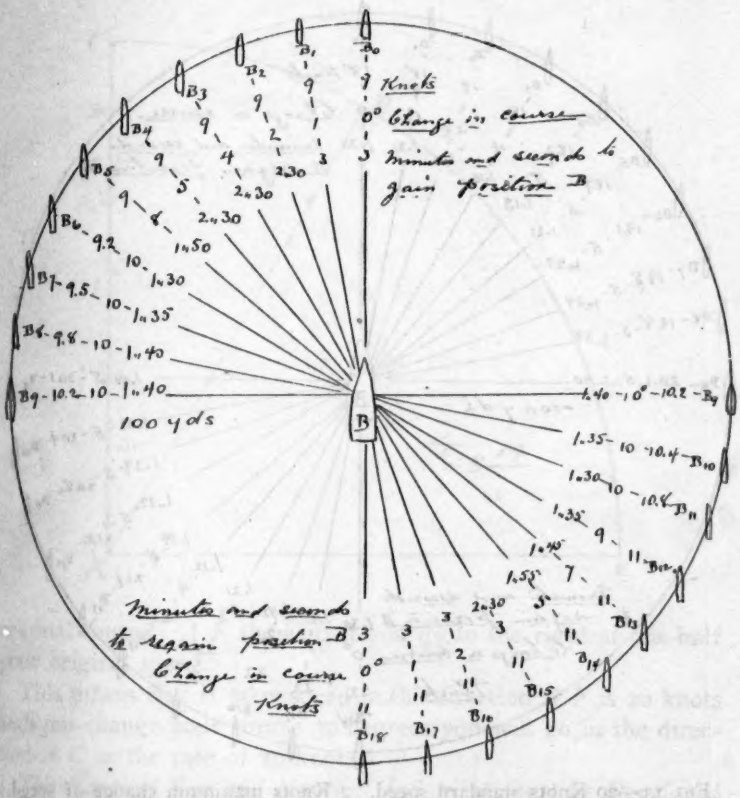


FIG. 12.—10 Knots standard speed. 1 Knot maximum change of speed. 10° Limit change in course.

If no more than 5 degrees change in course. The line *B-11* cuts the 5 degree radius at *E* on the 10 4/10 knot circle which means for a change of course of 5 degrees a change of speed to 10 4/10 knots.

To go from *B* to B_{13}, 20 knot standard speed, not more than 10 degrees change in course.

The line B-B_{18} cuts the 18 knot circle at F on the 8 degree radius and the 5 degree radius at G on the 18.7 knot circle, meaning that with a change of course of 8 degrees you change your speed to 18 knots; with a change in course of 5 degrees you change your speed to 18.7 knots.

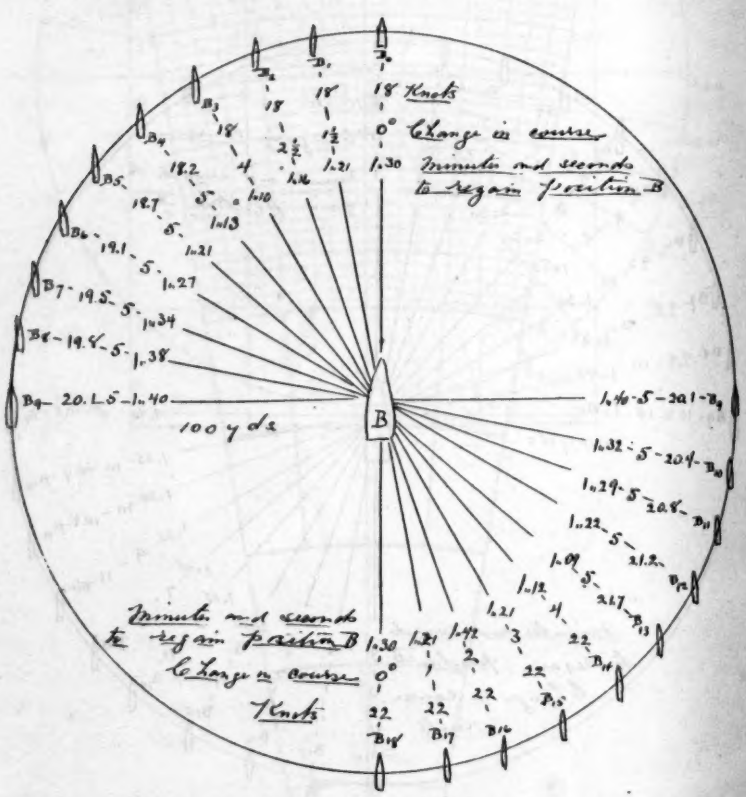


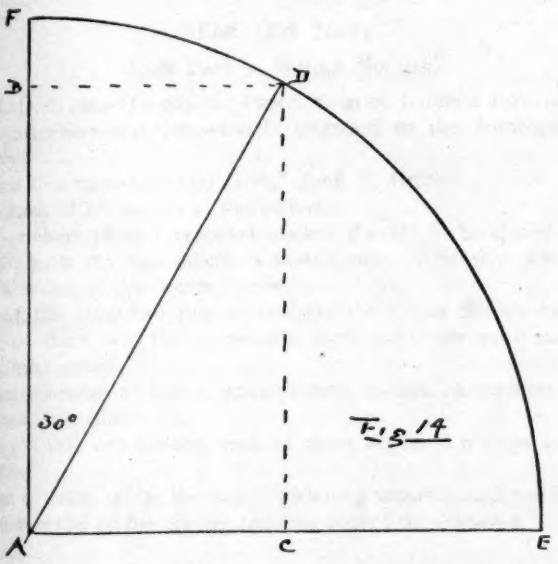
FIG. 13.—20 Knots standard speed. 2 Knots maximum change of speed. 5° Limit changes in course.

The distance of F from the vertical line F-H at the scale of knots gives 2.5 knots, is the speed at right angles to the course of the guide.

Figs. 12 and 13. B is your correct position in any line of bearing and taking a maximum error of 10 degree yards and every 10 degrees on the 100 yard circle the change in speed and change in course with resulting time to regain correct position, B, is

tabulated, with the intention of impressing on you the fact that with 100 yards error of position how quickly your position is regained.

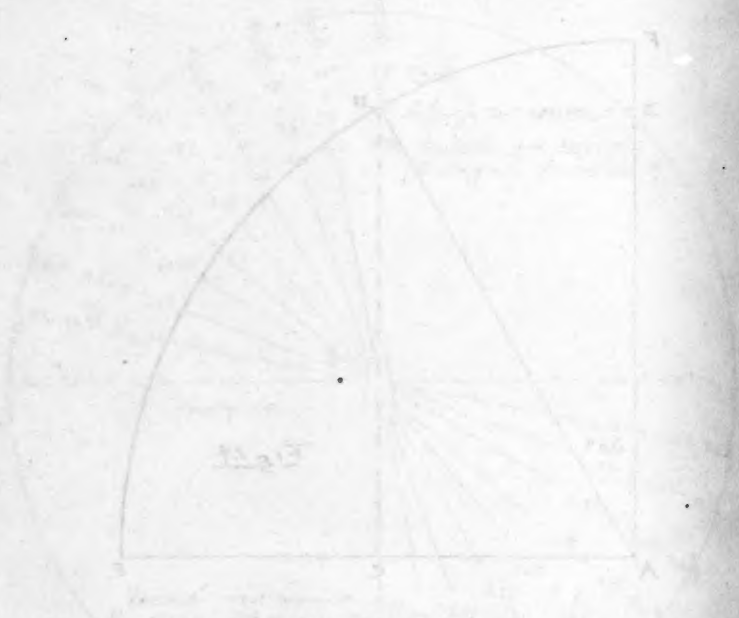
See Fig. 14. *A F* is the original course. *A D* a change of course of 30 degrees. *A D* resolves at right angles *A C* to the



original course. *A F* shows that you go to the right at one-half your original speed.

This means that if your speed in the direction *A F* is 20 knots and you change your course 30 degrees you will go in the direction *A C* at the rate of 10 knots.

The Nautical Eye and Nautical Judgment must be Developed Through Knowledge.



DISCUSSION

The Old Navy

(See Page 1, Whole No. 215)

Mr. M. D. Hyde.—To-day the Proceedings of January, 1921, reached me and my attention was immediately attracted to the frontispiece "The Old Navy."

At once I recognized "Old Griff," John T. Griffith.

To go back of his record as there given:

In November, 1870, I reported aboard the U. S. S. *Ossippee* in San Francisco, as a steerage officer, a midshipman. The ship was about to sail for a cruise in the South Pacific.

Most of the crew had just come from the China Station and Griffith was one of them, was the carpenter's mate, and I am quite sure he was of the China detail.

My remembrance of him is quite distinct, though 49 years have elapsed since I last saw him.

He was a tall, fine-looking man, of quiet, dignified manner and strictly temperance.

He was a "man before the mast" without a superior, and was held in the highest esteem by all the officers and men aboard the *Ossippee*.

Psychology in the Navy

(See Page 77, Whole No. 215)

Lieut. Commander K. C. McIntosh.—Some years ago the phrase "Scientific Management" ran through the navy like a prairie fire. It was on everyone's lips, and hundreds of officers talked glibly about it. The most noticeable feature of the talk was the odd fact that no two of the talkers had the same definition for the phrase. It was regarded as some new and wonderful discovery whereby the fortunate possessor of a knowledge of it could easily get nine hours work per day out of a navy yard mechanic or twenty-seven hours from a bluejacket. An omnivorous magazine reader could in ten minutes name the favorite magazine of any enthusiastic young officer by the arguments he used about "Scientific Management." One commanding officer under whom I served at that time seriously stated that "Scientific management is doing everything yourself. Never forget that!"

Meanwhile, the navy was putting into effect a few examples of scientific management—real ones; but they were not called by that name. Engineering and storekeeping competitions between ships demanded scientific man-

agement. The cost-accounting system made it possible in navy yards. Caustic inquiries from the Department to the commissary officers of ships with excessive ration cost forced their recipients to get busy and apply a little of it. The phrase dropped out of sight, but the idea, which as far as the navy is concerned was born the first time Congress cut down a naval estimate, remained. We have always had it, we have always used it to the best of our steadily increasing ability. When we lose it, we'll lose a war some day. In its last analysis, scientific management is merely making one dollar do one hundred and five cents worth of work when compared to the last previously spent dollar.

The catchword of the moment is "Psychology." Anyone can define it for you. "Science of Mind"—of course. In application, however, it is as indefinite as "Management" used to be; and the average man in conversation or writing seems to think it something brand new and esoteric, something mysterious which only the gifted can use and then only after digging into books. The grievous difference between this fad and the last is that a half-dozen watchful Bureaus were ready to crack the head of the officer who did not apply management to the spending of government money. But a not-too-well informed psychology enthusiast can work incalculable harm to the navy in a very short time, and there is little or no check on him.

There is no need to "introduce psychology into the navy" for it is there—has been there since the first war-galley slipped into the water and was conspicuous among the other tiny ships in the harbor because of her glittering scarlet paint and brass beak and well-fitting lug. Why is the salute—to impress upon the gob that the officer is a great man? No—just to remind him that men who live within eighteen inches of each other for months at a time have got to be polite to each other. Why insist upon the uniform regulations? To keep the idea firmly fixed in every man's head that he is one of the team and not an individual sea-rover. Why morning and evening colors? Not to drive home any intense regard for the particular threads of bright bunting on the halliards, but to make every man on board twice a day stand still for a moment and remember the ideals of his Service. For that matter, why are military services the only organizations in the world who cling fiercely and proudly to that word Service?

The Service and particularly the Naval Service is already a mass of applied psychology. Where trouble develops with personnel, it will be found that it is nine times out of ten the result of psychology misapplied by some one. The word itself is of new application. The thing itself is as old as the Service itself. "Get to know your men, young 'un," said the Adjutant to Dick Cottar. "Get to know 'em and they'll follow you anywhere."

When the Invincible Armada was in sight off Fastnet, there were many, even a majority of Englishmen who were terribly impressed by the psychology of that name "Invincible." The English crews were nervous and jumpy. Francis Drake never heard the word "psychologist," but he proved himself a master one. Loudly announcing that there was no hurry, "Let the wind drift 'em to loo'ard and we'll crack Don Philip's

skull!" in plain sight of the town and of the quay where his liberty parties were hastily embarking, he played tenpins all afternoon.

"Western Ocean Law," so-called was based on the psychological principle that an officer should be able to "lick every man in his division." In its new naval application of being able to show every man how to improve on his methods of doing his job, Western Ocean Law is one of the biggest helps to a happy ship we have to-day. The most of the Afterguard are young, or look so in these days; and the majority of the enlisted men have just about had time to learn how to take pride in a well-found clothes-bag. The new division officer who quickly demonstrates that he is a better plugman, a better water-tender, a better yeoman, a better rifle-shot, a better lookout, than any man in his division, has the way smooth before him. He may not call it Applied Psychology, but that is what it is.

In little things, applied psychology is in everyday use in every ship's department which shows the slightest sign of efficiency. Captain Taylor's article on Desertion is nothing more or less than a clean-cut discussion of psychology as it is used or abused in the navy. My article on training men, which appeared in the PROCEEDINGS of February, 1919, was an attempt to briefly group a few of the outstanding psychological principles which every officer in my corps has to learn if he wants his semi-annual reports to go forward without reference to him for comment.

Naval history is replete with stories of the kind of psychology which we need, and which, fortunately for us all, we have. "A hot place, sir; but mark you, I would not be elsewhere for thousands!" "Gentlemen, will it please you to charge?" "Keep your sword, Captain Dacres; but I'll trouble you for that hat!" "Damn the torpedoes!" and more recently, "Retire, hell! We just got here!" The "Science of Mind" resolves itself for our purposes into the "Knowledge of Men," and I am proud to say that I have had the privilege of serving under some of the foremost naval psychologists of my day. The captain who is cheered when he leaves the ship, the admiral who is rowed ashore by his officers, the division officer to whom his men bring their personal family troubles, these officers are psychologists, wittingly or unwittingly.

"Get to know your men, young 'un," said the Adjutant. He might have added, "You've got to—they'll get to know you, fast enough!" And first of all, "*Gnothi sauton.*" It pays.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Membership

Life, regular and associate, 5653. New members, 226. Resignations, 62. Deaths (1): Lieut.-Comdr. W. E. Davis, U. S. N. R. F.

Membership Campaign

A membership campaign is being conducted, both among officers of the regular service and of the Reserve Force. It is believed that *all officers* should support the Institute by joining. Publication costs are such that a large membership is imperative. The PROCEEDINGS are an excellent medium for keeping officers, and particularly those in an "inactive status," in touch with naval affairs.

Dues

The annual dues ($3.00) for the year 1921 are now payable.

Regular and associate members of the U. S. Naval Institute are subjected to the payment of the annual dues until the date of the receipt of their resignation.

Discussions

Discussion of articles published in the PROCEEDINGS is cordially invited. Discussions accepted for publication are paid at one-half the rate for original articles, or about $2.25 a page.

Address of Members

All members are urged to keep the Secretary and Treasurer informed of the address to which PROCEEDINGS *are to be sent, and thus insure their receipt.* Members and subscribers are urged to notify the Secretary and Treasurer promptly of the non-receipt of PROCEEDINGS, in order that tracers may be started. The issue is completed by the 15th of each month.

Book Department

The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books, should be considered. The cost will not be greater and sometimes less than when obtained from dealers.

Articles The Institute desires articles of interest to all branches of the service, including the Reserve Force. Attention is invited to the fact that the submission of articles is not limited to members, and that authors receive due compensation for articles accepted for publication.

Reprints of Articles The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the Secretary and Treasurer of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

Illustrations Authors of articles submitted are urged to furnish with their manuscript any illustrations they may have in their possession for such articles. The Institute will gladly co-operate in obtaining such illustrations as may be suggested by authors.

Original photographs of objects and events which may be of interest to our readers are also desired, and members who have opportunities to obtain such photographs are requested to secure them for the Institute.

Notice Whole Nos. 6, 7, 10, 13, 14, 15, 17, 144, 146, 147 and 173 of the PROCEEDINGS are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 75 cents per copy.

ANNAPOLIS, MD., February 15, 1921.

INFORMATION INDEX

	PAGE
ADVERTISEMENTS, INDEX TO	I
PUBLICATIONS, U. S. NAVAL INSTITUTE	(2)
SPECIAL NOTICE	464
TOPICS FOR ESSAYS	465
LIST OF PRIZE ESSAYS	467

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

ANNUAL FINANCIAL STATEMENT

1. The Annual Financial Statement for the year 1920 is submitted herewith.

2. Attention is respectfully invited to the following points:

(a) The assets and liabilities shown as of January 1, 1920, are the corrected figures as determined by the committee of the Board of Control which re-audited the accounts on June 15, 1920.

(b) During the year old books, which were of doubtful sale value, were charged off from the inventory, reducing this account by about $5800. The inventory figure is now based entirely upon live books.

Similarly, no dues of members who are now more than two years in arrears, or whose addresses cannot be found, are carried under "Dues Receivable" as assets to the Institute. About $6000 has been charged off as bad dues in this manner. The assets carried as of December 31, 1920 are therefore reduced to property and amounts due the Institute, from which the Institute has every right to expect a return.

BALANCE SHEET FOR THE YEAR ENDING DECEMBER 31, 1920

UNITED STATES NAVAL INSTITUTE

ASSETS			LIABILITIES AND NET WORTH			
Cash.			*Accounts Payable.*			
Farmers National Bank...	$26,990.84		Lord Baltimore Press	$14,844.83		
Savings banks.....	20,203.24	$47,194.08	Various dealers.....	448.11		
			Accrued royalty	431.92	$15,724.86	
Accounts Receivable.			*Prepayments.*			
Dues	$4,929.99		Dues	$1,289.04		
Subscriptions.....	36.97		Subscriptions.....	1,176.61		
Advertisements.....	313.78		Advertisements.....	75.00		
Miscellaneous	6,895.80	12,176.54	Miscellaneous	84.73	2,625.38	$18,350.24
Other Assets.			*Reserves.*			
Bonds.....	$97,640.62		Reserve fund.....	$8,684.09		
Inventory	30,436.65		Reserve bad debts	560.27	$9,244.36	
Prepaid royalties.....	108.23					
Furniture and fixtures....	1,841.70		*Surplus.*			
Prepaid expense.....	917.64	130,944.84	January 1, 1920.....	$171,434.50		
			Less			
			Loss for year.....	$4,892.32		
			Bad dues	3,312.51		
			Depreciation bonds.....	420.00		
			Trans. reserve.....	82.50		
			Trans. to overpayments ..	6.31		
				$8,713.64	162,720.86	171,965.22
Total assets		$190,315.46	Total liabilities and net worth.....			$190,315.46

TRADING AND PROFIT AND LOSS STATEMENT, YEAR ENDING DECEMBER 31, 1920

TRADING AND PROFIT AND LOSS STATEMENT, YEAR ENDING DECEMBER 31, 1920

Trading.	*Extra Publications.*		*Purchased Books.*		*Proceedings.*		*Totals.*	
Sales		$43,878.15		$1,939.95		$533.44		$46,351.54
Purchases	$40,351.06		$1,905.61		$21,364.57		$63,621.24	
Inventory, Jan. 1, 1920	15,072.82						15,072.82	
	$55,423.88		$1,905.61		$21,364.57		$78,694.06	
Inventory, Dec. 31, 1920	30,206.65		230.00				30,436.65	
Cost of sales		25,217.23		1,675.61		21,364.57		48,257.41
Trading loss		$18,660.92*		$264.34*		$20,831.13		$1,905.87
*Gain.								
Operating Expense.								
Postage						$1,678.99		
Advertising						787.14		
Board meetings						1,342.24		
Prize essays						400.00		
Office expense						1,311.43		
Salaries						10,936.31		
Auditing						200.00		
Contributors						4,373.95		
Express and hauling						510.82		
Insurance						28.42		
Discount						45.62		
Envelopes for Proceedings						586.25		
Royalty						5,113.70		
Gift (Wilkes Memorial)						100.00		
Depreciation in furniture and fixtures						64.00		27,478.87
Operating loss								$29,384.74
Miscellaneous Income.								
Advertisements						$3,479.61		
Binding						115.40		
Interest						6,608.36		
Subscriptions						3,060.53		
New members						413.24		
Sundries						87.79		
Dues						10,727.49		24,492.42
Net loss								$4,892.32

CHANGES IN NET WORTH, YEAR ENDING DECEMBER 31, 1920

Assets	*January 1, 1920**	*January 1, 1921*	*Increase*	*Decrease*
Cash Farmers National Bank	$33,109.43	$26,990.84	.....	$6,118.59
Cash savings banks	19,535.38	20,203.24	$ 667.86	.....
Dues receivable	9,237.56	4,929.99	.....	4,307.57
Subscriptions receivable	60.25	36.97	.....	23.28
Advertisements receivable	354.20	313.78	.....	40.42
Accounts receivable	9,401.48	6,895.80	.....	2,505.68
Investments	98,060.62	97,640.62	.....	420.00
Inventory of Institute books	15,072.82	30,206.65	15,133.83	.....
Inventory of purchased books	.....	230.00	230.00	.....
Prepaid royalty	200.00	108.23	.....	91.77
Furniture and fixtures	1,556.00	1,841.70	285.70	.....
Prepaid expense	446.17	917.64	471.47	.....
			$16,788.86	$13,507.31

Liabilities	*January 1, 1920**	*January 1, 1921*	*Decrease*	*Increase*
Accounts payable Lord Baltimore	.....	$14,844.83	.....	$14,844.83
Accounts payable miscellaneous	$256.44	448.11	.....	191.67
Accrued royalty payable	2,542.05	431.92	$2,110.13	.....
Prepaid dues	969.38	1,289.04	.....	319.66
Prepaid subscriptions	996.39	1,176.61	.....	180.22
Prepaid advertisments	.....	75.00	.....	75.00
Sundry overpayments	1,508.02	84.73	1,423.29	.....
Reserve fund	8,444.09	8,684.09	.....	240.00
Reserve for bad debts	883.04	560.27	322.77	.....
			$3,856.19	$15,851.38
Totals			$20,645.05	$29,358.69
Decrease in surplus (see balance sheet)			8,713.64	.....
			$29,358.69	$29,358.69

* Found correct by re-auditing committee, June 15, 1920.

Audited and found correct.

T. L. JOHNSON,
Captain, U. S. Navy.
E. J. KING,
Captain, U. S. Navy.
B. C. ALLEN,
Commander, U. S. Navy.
Auditing Committee.

Approved by the Board of Control February 14, 1921

H. K. HEWITT,
Commander, U. S. Navy,
Secretary and Treasurer.

• Found correct by re-auditing committee, June 15, 1920.

PROFESSIONAL NOTES

PREPARED BY

LIEUT. COMMANDER H. W. UNDERWOOD, U. S. Navy

GENERAL ARRANGEMENT

VESSELS BUILDING.
NAVAL POLICY.
MATÉRIEL.
PERSONNEL.
MERCHANT MARINE.

France 405
Great Britain 407
Japan 420
United States 423

AERONAUTICS 431
ENGINEERING 436
RADIO 441
MISCELLANEOUS 442
CURRENT NAVAL AND PROFESSIONAL PAPERS 446

FRANCE

THE FRENCH NAVAL YEAR.—Waste and stagnation sum up the 1920 naval year so far as new construction and sea training, that is to say, actual fighting efficiency, are concerned. Poorly-designed cargo boats and liners absorbed the main attention of state dockyards to the detriment of the navy and also of the rate payers, showing, in wasted millions, the beauty of socialistic methods and of government by the unfit. Next, a swarm of unmilitary *avisos* of 850 tons, *canonniéres* of 500 and 650 tons—*poussiére navale* of the worst kind, able neither to fight nor to run, the designs of which, hastily improvised under pressure of hostilities, ought to have been dropped at the Armistice if due consideration had been given to the national interest—have occupied, and are yet occupying in a leisurely manner most of our private dockyards, to the cost of over a hundred million francs, which, invested in bona-fide warships, would have meant substantial additional strength. The modified 1000-ton destroyer *Enseigne-Gabolde* (*Normad*) is not yet completed. Progress accomplished in England, Italy, and America in that line of construction depreciates her value, and renders her to a certain extent obsolete. Ex-Boche cruisers and destroyers incorporated in the fleet have been so badly *sabotés* as to represent a costly and doubtful acquisition.

In the submarine line, the last of the *Fulton* class of 870-1270 tons have joined the flotillas after successful trials, or are undergoing their final tests. Several units of the *Amaranthe* series have been fitted as minelayers, while the small *Creusot* boats (*O'Byrn, Fournier, Dupetit-Thouars*) of the *Laubeuf* design are ready. The minelaying *Chailley* (Normand-Fenaux plans) and *Callot* (Bordeaux) are approaching completion. New and larger boats were ordered a few months since at Cherbourg and Toulon. Much headway had been made in the creation of a bombing aerial fleet, whilst lack of personnel and funds, together with neglect in direction, have caused a hundred of new machines to go to waste. On the whole, when are considered the progress accomplished in rival navies, the Marine Française

is seen to have been retrograding in the course of the last year, especially remembering that deep discouragement prevails among the personnel of officers and non-commissioned officers; that ignorance of the lessons of history has made up crews with anarchistic workmen; that lack of reliable specialists in sufficient number (together with the amazing manning mutations that transfer officers and men from one ship to the other, every few weeks or every few months) baffles the efforts of patriotic commanders towards a resumption of bona-fide war training.

This is a gloomy picture indeed, and verbal optimism cannot alter facts. The future, happily, is more promising, as 1921 is to see new construction and rational training in full swing. Concrete benefit is to be derived from the substantial work accomplished in the field of invention. Two experimental guns of 450 mil., with 1500-kilo shells, designed by General Charbonnier, are to be tested some eight months hence. They mark a new departure in several important respects, and an advance on what is known to have been realized in England and the States with the 18-inch caliber. Should circumstances and the success of the experiments now being made with unsinkable hulls lead France to lay down her projected battleships in 1922-23, the fine 16-inch American dreadnoughts would be rendered well-nigh obsolete and outranged, and France would leap anew to the fore. Calibers will decide in artillery contests, and, with the coming changes in powers of offense and defense, it pays to wait; such, at least, is the contention of those who overlook the factor Time and take it for granted that no war will burst out before France is in a position to face it. With regard to the armament of projected light craft, it has been judiciously and officially recognized that henceforth the 4-inch caliber is too weak for destroyers, and similarly that the 5.5-inch weapon, though excellent, no longer meets cruiser requirements, and must be replaced by 7.6-inch and even 9.4-inch (light) guns if French *croiseurs légers* are to be a paying investment. The U. S. S. *Omaha* (twelve 6-inch guns), for instance, may be efficiently armed to fight destroyers, but they would have a very poor chance against the British Raleighs (seven 7.5-inch weapons) that fire shells about twice as heavy, and would hopelessly outrange them. As speed must combine with caliber to make fighting worth, and as, on the other hand, the Rue Royale authorities are alive to the importance of superior quality for the reduced fleet of the republic, the question of motors is being studied in close co-operation with private firms. It has been decided, on a request by the Commission de la Marine, to commence or order in 1921 no fewer than 36 submarines of 1200 and 600 tons, to be constructed at Toulon, Cherbourg, Rochefort, St. Nazaire, Bordeaux, Rouen, and La Seyne. For the first time the bulk of the contracts will go to private industry; hence quicker delivery and better work. Mons. Landry is credited with the intention of utilizing the healthy spirit of emulation that prevails among private constructors and *ingénieurs de la marine*. If so, a new era will open for the French underwater fleet, that has had so very much to suffer from the glaring incompetence of the Section Technique, as well as from the inefficiency of state arsenals, that require several years to complete submarines of a few hundred tons.—*The Naval and Military Record*, Jan. 12, 1921.

PROSPECTS IN NAVAL AVIATION.—This year is to see strides in naval flying. The many obstacles that lay across the route of aerial progress are being gradually removed; the number of young officers taking to aviation is daily increasing as the result of ministerial encouragements to the new branch; and our leading flag officers, although themselves partial to the mighty armorclad, king of the ocean, no longer shut their eyes to the fact that superiority in the air is the one point of vantage which lies within the reach of France, in the present state of her finances, and that would enable her to fully utilize her remarkable strategic assets. There appears, up to the present, to be a wide difference between the French and the British ways

of looking at the air problem, although ultimately the French organization may come to resemble the British, the latter being better adapted to naval needs. Here, as in England, naval flying is realized to be yet in the experimental stage. Seaplanes are so fragile and so short-lived that it would be a mistake to construct, at heavy cost, too many machines of a given type, that would risk being obsolete in a very short time, though the advent of the armored all-metallic machine—and here France, being the richest aluminium producer in Europe, will have a substantial advantage—will by degrees cause the aerial fleet to rank on the same footing with ordinary ships in the matter of longevity.

Therefore the French policy aims at constituting an air wing made up of three successive *echelons:* (1) *Flottilles de combat* at all times ready for instant action in co-operation with the fleet and comprising a limited number of up-to-date machines of the various types manned by thoroughly efficient specialists; (2) *flottilles de reserve,* composed of commercial machines (and dirigibles) designed with a view to easy transformation to war use, and manned by naval reservists employed in the over-Channel or over-Mediterranean lines of aerial transportation; (3) *flotilles d'entrainement et de mobilization,* that will have their headquarters in St. Raphael-Toulon and in the other ports militaires, and would be made up of older machines only fit for coastal duties and also of the latest models, the wholesale construction of which would start at the first threat of war, to be manned by the skilled personnel of the *ecoles d'aviation* and by the numerous recruits and volunteers ever in training. The latter mobilization force, besides being available for special missions, would be available to fill the gaps made by casualities in the *flotilles de combat.* An arrangement of this sort would satisfy both the interest of efficiency and of economy. Hence the decision of the Admiralty to eventually "subsidize" and, to a certain extent, control the Marseilles-Algiers, Marseilles-Oran, Marseilles-Tunis, Toulon-Corsica-Bizerta, and Bordeaux-Morocco projected passenger and goods lines. Aerial traffic between France and her colonies is to be the monopoly of French lines, and, considering the unique position of France on one side, and of thriving Algeria, Tunisia, and Morocco on the other, Frenchmen are seen to have every reason to try to possess the most important aerial force in the Mediterranean, though Great Britain, with the London-Paris-Marseilles-Malta-Egypt route (which growing speed and radius of action will make a reality within the next few years), will be a dangerous competitor in the Mediterranean aerial rivalry.

It may be taken for granted that true efficiency in naval aeronautics is to be sought in close and permanent co-operation with military and civilian aviation. Like the sea, the air may be said to be all one, and Minister Landry has rendered his country a service by throwing down the watertight walls which red tape had erected between the several aerial administrations. Thus, he has just placed at the disposal of the *Sous-Secretariat de l'Aéronautique* 10 *officiers de vaisseau,* 12 *ingénieurs de la marine* and about 30 other officials, which means that henceforth the navy is to directly benefit by the comprehensive experimental work conducted under the auspices of the Air Ministry, which is responsible for the creation of a powerful air fleet for peace and eventually for war use. To that end no less than 185,000,000 francs is to be spent in 1921, of which 28 million francs is for subsidies to aerial lines, 9 million francs for the construction of four rigid dirigibles, 18 million francs for dirigible ports, 24 million francs for enlarging training centers, one million francs for seaplane experiments, etc. This in addition to aviation credits in the Marine Budget.—*The Naval and Military Record,* Jan. 19, 1921.

GREAT BRITAIN

IMPERIAL STRATEGY AND A COMBINED STAFF.—The debate initiated by Lord Haldane in the House of Lords on May 5, following on the publica-

tion of various letters and articles in the press, shows that public opinion is becoming interested in a subject which is of vital importance to the future of the Empire and one which has been exercising the minds of officers of all three services during the past two years, namely, the control of Imperial Strategy.[1]

2. At the same time, after reading recent expressions of opinion, both service and civilian, it is impossible to avoid feeling that the wide diversity of view evidenced is to some extent due to the various writers and speakers having in mind organizations and functions which are by no means identical. This view is strengthened when one observes that the organization under discussion is indifferently referred to as an Imperial General Staff, a Ministry of Defence, or a combined staff, and its functions outlined by different speakers on the same occasion in the following terms:—(*a*) Distinguished general officers who direct and influence the activities of the special staffs of the forces; (*b*) in place of the Committee of Imperial Defence presided over by the Prime Minister, a Minister of Defence, supreme over all the services, directing military policy in regard to the future with the aid of the new Imperial General Staff; (*c*) an Imperial War Cabinet; (*d*) a staff to control naval, military or air operations.

3. It seems possible, therefore, that a short discussion of the various principles underlying the conduct of imperial strategy and the organizations now in existence for carrying them into effect may lead to a clearer understanding of the changes which a large body of military opinion to-day considers necessary.

4. First of all; what in general terms are the functions required of those organizations charged with the control of Imperial Strategy?

These are as follows:

A. In Peace.—(i) To consider all world situations which may necessitate the employment of armed force, to work out the strategic measures by which such situations can best be met and the forces required for the successful conduct of operations should peace strategy[2] fail to produce a favorable settlement.

(ii) To collect, sift, and assimilate all forms of intelligence which may be of value in determining the direction which should be given to imperial policy in peace and the strategy which should be adopted in war.

(iii) To consider and work out the organization and system of training of the forces of the Crown which will best meet the requirements of campaigns under the varying strategic, tactical, and climatic conditions which are foreseen as probable.

(iv) To ensure that the orders of the chief, under whom the particular staff functions, are duly executed.

B. In War.—(i) To consider the strategy which should be adopted.

(ii) To collect, apply, and disseminate intelligence.

(iii) To advise the commander under whom the staff acts.

(iv) To ensure that the orders of that commander are duly executed.

5. We thus arrive at two distinct conclusions:

(*a*) That both in peace and war the work of a staff is in the main contemplative and advisory, and only in one respect executive.

(*b*) That the problems which staffs are called upon to study vary in scale from those involving a review of the whole world to those concerned with one particular area only; that the forces with which they are called upon to deal vary from those of the Empire to those engaged in one

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[1] The term "Imperial Strategy" (Imperial Defence is a misnomer) is used in this article in the widest sense, covering the examination in peace time of all problems which may affect the future safety of the Empire, diplomatic or other peaceful action necessary to secure that safety, and, in war, the control of operations undertaken with the same end in view.

[2] Peace strategy includes diplomacy, economic pressure, formation of alliances, etc.

particular theater of war; that the intelligence which they have to assimilate varies from that of world-wide scope, and often only indirectly affecting naval or military strategy (*e. g.*, information as to foodstuffs, raw materials, merchant shipping), to the local information required by a commander in a particular campaign. Speaking generally, however, the above duties fall into four categories:

(i) Those concerned with the security of the Empire and with the forces of the Crown as a whole.

(ii) Those dealing with the combined action of the navy, army and air force of the United Kingdom.

(iii) Those concerned with the organization, training, etc., of one service alone.

(iv) Those concerned with the conduct of operations at sea, on land, or in the air, where the action of one service alone is involved.

Although these four categories will often overlap, none the less it seems clear that their characteristics are sufficiently distinct to necessitate the existence of separate bodies, each suitably organized to carry out its particular task.

6. Having now ascertained the principles in relation to imperial strategy to which effect has to be given, let us next consider the bodies which exist to-day for that purpose and the extent to which they fulfil their rôle.

There are today:

(i) The Committee of Imperial Defence.

(ii) The departmental staffs of the Admiralty, War Office and Air Ministry.

(iii) In war, the staffs of commanders-in-chief at sea, in the field, and perhaps in the air.

7. The Committee of Imperial Defence is presided over by the Prime Minister, and consists of such statesmen as he may call in to discuss any subject under consideration. Members of Dominion Governments when in England may also attend its meetings. It possesses a small secretariat charged with the duty of collecting information and securing continuity of policy. The committee meets at varying intervals, but works mainly through sub-committees. To its meetings, or those of its sub-committees, are summoned the heads of the fighting forces in the Admiralty, War Office or Air Ministry, when matters affecting their departments are under consideration.

The committee is thus essentially political, altering its composition with each change of government, hearing expert witnesses, but allowing them no opportunity of influencing decisions by the recording of their vote. Valuable as has been the work done by the committee it suffers from certain inherent defects.

(i) Its president and members are men already overburdened with duties of state.

(ii) Its meetings are only held at comparatively rare intervals, and then for the discussion of a particular question only. In the intervals between its meetings, continuity of policy is only secured by the secretariat, which has neither authority to act on its own initiative, nor would be a suitable body to which to entrust any power of decision. Consequently, there is a lack of continuous effort, an absence of long thought out and well matured policy, and questions often reach an acute stage before they are dealt with; with the result that hasty decisions, not always perhaps those which would have been arrived at after fuller consideration, are taken, or a decision is delayed in a matter in which early action is of importance until the question at issue shall have been threshed out.

(iii) Expert opinions laid before the committee—which, again, be it noted, is composed of politicians—are generally based on a purely departmental view of the situation; that is to say, the soldier expresses the military view, the sailor the naval one, and so on. It is then left to a purely civilian body to decide what weight should be attached to the technical objections

raised by naval experts to the proposals put forward by the military authorities and *vice versa*, to consider the merits and demerits of alternative schemes in the face of these objections, and, finally, to take decisions of the greatest moment and often involving the overruling of the views held by one or other of the service experts. How grave may be the results which will follow on such a decision the report of the Dardanelles Commission illustrates.

The responsibility of deciding between the views of service experts is one which should never be thrown on any body of statesmen if it can possibly be avoided, and with a sound staff organization the occasions when it cannot be avoided should be extremely rare.

(iv) Proposals laid before the Cabinet are rarely, if ever, thoroughly threshed out in detail jointly by navy, army, air force and other departments involved (*e. g.*, Ministries of Shipping, Transport) before they are brought forward for decision, or if so considered, then only by committees or conferences summoned *ad hoc*, composed of men who perhaps meet for the first time, or who at best do not know each other intimately, and who consequently are inclined in practice, perhaps insensibly, to take up a defensive attitude in favor of the proposals put forward by their own departments, and to underrate the objections raised on the part of the other services.

(v) The Committee of Imperial Defence is not truly Imperial, since members of Dominion Governments are rarely available to take their places at its meetings, and there are no Dominion officers of sufficient standing permanently located in this country to represent the views of their government.

8. Departmental staffs of the Admiralty, War Office and Air Ministry deal with plans, intelligence, organization and training almost entirely from the point of view of their own service. As a result, insufficient regard is paid, in considering these problems, to the capabilities and limitations of other services, and insufficient weight is given to such factors as transportation and the like which have a very real bearing on these matters; there is much overlapping in the matter of intelligence, for each department is served by its own intelligence service, although the bulk of the information collected is of common use and only a small portion of value to one particular service alone; the system of organization and training of any particular service, with which are so intimately bound up its limitations and capabilities, are little understood by the other services; personal contact is lacking, and that co-operation which is induced only by intimate knowledge of each other's habits, methods and personality is consequently absent.

9. In war at sea, on land or in the air, we have the naval, military or air staffs of commanders-in-chief as the case may be.

Although such staffs serve their purpose when operations are of a purely naval or military nature, it is when we come to consider operations in which two or more services are acting in combination that we find the situation unsatisfactory. Each staff works separately under its own commander. A hard and fast division of duties, rigid demarcation of spheres of action (*e. g.*, high-water mark in the case of landing operations) and the like have to be enforced, not because they best suit a particular situation, but because the two staffs do not work as one staff, do not use the same terms, are not accustomed to see things with the same eye—because, in short, they can, with the best will in the world, only co-operate by rule of thumb, by the letter of the law. How real is this rigidity and how vitally it may affect the success of combined operations is well known to all who have taken part in such operations either in peace or war.

10. Reverting then to paragraph 5, we find that there are now in existence bodies which in greater or lesser degree deal with:

(i) Imperial strategy; but only in a limited degree.

(iii) The organization and training of each service individually.

(iv) The operations of naval, military, or air forces acting alone; but none to meet the requirements of (ii) combined operations.

11. What, then, are the changes in organization which are necessary to secure the successful execution of the four categories of staff duties mentioned above?

All such changes in organization must be based on four axioms:

(i) That the making of war is as much an act of government as the conduct of peace strategy.

(ii) That, having regard to the geographical conformation of the British Empire, every operation of war viewed in its broadest aspects must be a combined operation.

(iii) That our strategy must be imperial.

(iv) That to ensure successful staff work, full value must be assigned to the personal equation.

12. Let us now apply these axioms.

(i) Since the policy of peace and war is an act of government, its control must be in the hands of statesmen and not of sailors, soldiers, or airmen as such. So far a Cabinet Committee meets requirements. On the other hand, statesmen before making decisions must have at their disposal the best expert opinion available. It is in this respect that the effect of axiom (ii) that every operation of war in its broadest aspect is a combined one at once makes itself felt.

(ii) Assuming for the moment air force co-operation with both navy and army to be a matter of course, it is clear that the degree of combination between these two latter services will vary in every individual situation. In one case the army may require the navy's co-operation only indirectly in matters of transportation, maintenance of sea communications, keeping open trade routes and the like; in another, as in the Dardanelles campaign, it may require the very closest tactical support; while at the other extreme in a campaign where the main objectives are naval it is the navy which would require the co-operation of the army in seizing and holding advanced bases necessary for the successful prosecution of maritime operations.

Whatever form, however, this co-operation may take under varying conditions, the main point to note is that in every case naval and military requirements must be to some extent antagonistic. It is no use a soldier selecting a theater of war in which to operate if the navy cannot transport the necessary forces thither in safety nor maintain sea communications open. It is equally useless for a sailor to insist on landing military forces at a spot which is ideal for the purpose if military operations cannot be developed thence. In short, the strategy of combined operations is one of the rare instances where compromise is, generally speaking, not only necessary but desirable. It therefore come to this: In order that statesmen may be enabled to adopt the wisest imperial policy in peace and the soundest line of strategy in war, they must receive expert advice tendered, not by departmental heads of the services and based on the requirements of the service which they represent, but by a single mouthpiece and based on the mature consideration of the best brains of all three services working in conjunction. Whether this mouthpiece be a minister of defence, the chief of a combined general staff, or a written memorandum jointly drawn up by the chief representatives of each service on that combined General Staff, is a matter of secondary importance. The vital point is that the advice tendered should be the outcome of combined deliberation, that alternative proposals put forward should represent the advantages and disadvantages of each from the point of view of all three services, and not, as is apt to be the case at present, take the form of one scheme favored by the navy because it provides conditions ideal for naval operations, and another adopted by the army because it best fulfils military requirements. In short, no proposal considered impracticable by one or other service should be put forward to the government as a suggested basis for combined operations, but only those which all three are

prepared to accept as feasible. It then only remains for the cabinet to adopt that which, when regarded from a wider viewpoint than that bounded by the horizon of naval or military advantages and disadvantages, appears most likely to ensure the successful prosecution of imperial strategy.

In this respect there is no room for doubt that our organization of to-day completely fails to carry out its rôle.

(iii) Strategy must be imperial; therefore the General Staff which is to advise in regard to it must be imperial; it has to deal with problems affecting the Empire as a whole, therefore it must consider the forces of the Empire as a whole. Here at once arises a difficulty. The Dominions reserve, and always will reserve, to themselves the right to dispose of their forces in peace and to organize them primarily for local defence; even in war their employment for imperial purposes can only be reckoned on subject to the consent of the Dominion Government given when the emergency arises, a consent which, fortunately for the Empire, is never likely to be withheld if the cause be a just one.

Since therefore responsible Ministers of the Dominions cannot spare the necessary time regularly to attend meetings of the Cabinet or Committee of Imperial Defence, but can only be present on rare occasions to discuss matter of first importance, and usually when these have reached an acute stage, it is all the more necessary that their views should be continuously represented and problems affecting them considered by representatives on an Imperial General Staff in whom they have confidence; for only if the Dominions are so represented, only if they feel assured that their side of the picture has been made perfectly clear by men who know the situation thoroughly, only then will they be willing to accept a policy based on the recommendations of that staff. At present Dominion problems are worked out at home by British officers, or in the Dominions by Dominion officers, without the possibility of close personal touch, and with the meager assistance afforded by official correspondence as the sole method of securing co-operation. As a result, Dominion Governments are inclined to view any policy proposed from England with suspicion and to prefer proposals put forward locally as more likely to fulfil the requirements of their country, though perhaps far less satisfactory when regarded from the point of view of the Empire as a whole.

(iv) Successful combination depends on due recognition of the importance of personality. It is perhaps little realized by the general public how large a factor in staff work the personal equation plays. Yet there is no more noticeable feature, both in peace and war, than the increase in efficiency attained by a staff when the individual members have worked together for some time, have learned each other's idiosyncracies and habits and have begun to work, not as individuals, but as a team. The case of the different services working in combination is exactly parallel. Each has its own habits and methods of doing things, each has its own language, each at first looks on the other with suspicion. Only, therefore, by continuous personal contact can that close co-operation between individuals and between the services be attained which is the essence of success in the consideration of problems of combined strategy or the conduct of combined operations of war. Interdepartmental committees, conferences and similar fortuitous meetings for the discussion of a particular question can never produce sufficiently close unity of thought. Members of these committees, etc., meet as representatives of their departments to urge the views of those departments, and not as individuals striving towards a common goal. The Plans Department of the Admiralty and the Operations Directorate of the War Office may consult each other officially a hundred times in regard to a problem, may hold conferences and appoint committees, but the results achieved under such conditions never approach in value those which would follow in a far shorter space of time on the labors of three or four men who had worked together

previously and knew each other well. In short, in combined staff work, and no less in imperial staff work, the personal equation is everything.

13. Finally; what definite conclusions can be drawn from the above discussion?

(i) The direction of imperial strategy demands:

(*a*) A body of statesmen with whom must rest the final decision as to the policy to be adopted. The more imperial the composition of this body, the more universally will its decisions be accepted throughout the Empire. Whether such an end be attained by the creation of an Imperial Council in England, by following Mr. Watt's suggestion "that Great Dominions would do well to keep responsible Ministers at the seat of Empire Government," or by other means which have been suggested, is beyond the scope of this article to discuss. What we must aim at is an increased measure of imperial control in matters affecting the Empire.

(*b*) In place of the secretariat of the Committee of Imperial Defence an expert body, comprising the best brains to be found in the forces of the Crown; a body which has learned to work as a team; a body which will continuously and systematically contemplate the world situation as it affects the well-being of the Empire, and which by "thinking ahead" will be prepared at any time to tender the combined opinion of the three services as to the best method of dealing with situations which arise or are foreseen as likely to arise; a body which in war shall supply the Cabinet with the best advice obtainable as to the strategy of combined operations, taking into account the requirements and limitations of all three services; a body which shall secure co-ordination in the conduct of all such operations; a body which shall speak "with one set of lips."

(ii) Combined operations of the three services require a combined staff to secure their successful development. This does not mean that the naval commander-in-chief should serve under the military or air force commander-in-chief, or *vice versa*. Each has his own sphere of command, each has his own rôle to carry out. What it does mean is that the staff duties of the three services, which in such operations are interwoven to an extent perhaps little realized, must be carried out by men who know each other personally, who understand the habits, ideas and language of the sister services intimately, and who consequently work towards a common goal as a team, but each keeping his own place in the field, without friction or misunderstanding. Only if such a system be introduced can that "rigidity" which has so much hampered combined operations in the past be obviated.

(iii) The organization, training and equipping of the three services in such a way as will best fit them to carry out the policy of the government are the functions of the staffs of those services. No comment on this conclusion would appear to be necessary other than to say that in such matters an imperial organization, system of training and method of equipping should be aimed at, were it not for the fear expressed by naval writers that the existence of an Imperial General Staff would interfere with the control of the Admiralty over naval forces in these matters. Such a fear is groundless. The function of the Imperial General Staff is to advise the government as to the policy which will best meet the requirements of the Empire. The function of departmental staffs is to train, organize and equip their respective services to fulfil these requirements. The division of duties is clear cut and well defined, and there should be no cause for overlapping or mutual interference.

(iv) We have to consider the executive functions of the staff in war. It is this aspect of the Imperial General Staff which the navy views with the greatest suspicion. This suspicion appears to be based on the fact that the Admiralty, unlike the War Office or Air Ministry, actually controls operations of war. The centralization of command in the navy, made possible by the advent of wireless telegraphy, allows the Admiralty to act the part of "Supreme Command" in regard to naval forces. The

War Office, on the other hand, owing to the different conditions which prevail in land warfare, can never interfere with the discretion of a commander-in-chief in a theater of war beyond laying down the general policy to be adopted. In short, the difference is this: The Admiralty in certain cases exercises executive command, War Office and Air Ministry do not. None the less the dread of interference by the Imperial General Staff with the executive control of the Admiralty over fleets at sea is baseless. The functions of the Imperial General Staff would in no case extend to the issue of executive orders to the fleet or, for the matter of that, to land forces. Does any advocate of the Imperial General Staff contemplate the issue by that staff of orders to the commander-in-chief of the fleets in home waters to move out to attack the enemy fleet at a certain hour, or to a commander-in-chief in a theater of war to attack the enemy on a certain day on such and such a front? I trust not. No, its executive functions would be limited to the issue of "*directives générales*" (to use a French expression which is exactly opposite but has no parallel in our vocabulary) laying down the general objective of the combined operation and the measures necessary to secure co-operation between the three services. It would then rest with the departments concerned to decide upon the actual forces to be employed, and finally with the combined staff of the naval, military and air force commanders to carry out the detailed arrangements for the operation.

Under such conditions there would be no risk of interference by the Imperial General Staff with the executive control of the Admiralty in combined operations, and still less in operations in which the navy was alone concerned.

14. Such, then, in outline are the principles underlying the direction of imperial strategy, the organizations existing at the present time to carry them into effect, and the main alterations which appear necessary to provide for the security of our Empire in the days which lie ahead.

To-day we stand on the threshold of a new world wherein the old order changeth, giving place to new; well-known landmarks of the past have disappeared and new and as yet unrecognized ones are looming through the mist ahead. To-day, therefore, it behooves us to break down all vested interests, to cast aside all shibboleths and look reality in the face. What is our common aim? There can be but one answer—security of Empire. What matter then if Admiralty be degraded or other departments shorn of some of their present power? Surely no matter at all if thereby we save the state. What, after all, are Admiralty, War Office and Air Ministry but a name, a sentiment? Transfer the best of the brain power which these departments now absorb to an Imperial General Staff where each service is still master in its own house, but all three work together in unison for the common cause, and what does any one of the three lose? Nothing. The prestige of Admiralty, War Office or Air Ministry is unimpaired; it is merely transferred to another sphere.—*Journal of the Royal United Service Institution*, November, 1920.

THE ADMIRALTY AND RESEARCH.—It has in the past been a matter for reproach that the military services showed themselves slow to appreciate the great potential value of research, and of the economy which must eventually result from the expenditure of a reasonable sum on scientific investigation. There can be no doubt of the value of research when well directed, since we have before us, as instances, the completely equipped and well-staffed laboratories of many American engineering, scientific and industrial firms, whose experience is that the results of one important discovery are capable of defraying the whole cost of the research establishment for many years. Appreciating this fact, the Board of Admiralty decided, many months ago, that a research department was a necessary part of the scientific organization of the Admiralty, and decided to establish it near the National Physical Laboratory. In this new building, which, it is hoped, will be completed and occupied by the spring of next

year—1921—will be concentrated a large proportion of the scientific research on physical subjects, which has to be undertaken in order that the elucidation of the problems which are confronting the navy may be continued, and in order that Great Britain may not lag behind other countries in the application of the latest scientific discoveries to the needs of defence. The work will be under the immediate direction of Mr. F. E. Smith, F. R. S., whose appointment as director of scientific research to the Admiralty has recently been announced.

This appointment, it is to be noted, does not affect the organization or conduct of existing naval experimental stations, but rather supplements them, for it is admitted that departmental experts, though often having many years of specialized training and experience behind them, are not in the best position to realize and adapt to their own needs the valuable discoveries which are being made in the various branches of science. One of the duties of the director of scientific research is to ensure that all development work proceeds in full knowledge of the latest scientific discoveries, for, however academic a piece of research may seem, it is certain that, sooner or later, practical and useful application will be found for it. The director of scientific research is in constant touch with scientific work and workers of all kinds, whose researches have a bearing on subjects which are of naval interest, and it is in order that special problems of naval importance, but which are otherwise of limited usefulness, may receive immediate attention, that the research laboratory is being constructed. Concerning the nature of the work which is to be carried out at Teddington, we are unfortunately unable to say much. It may, however, be stated that, although many of the investigations are secret, yet the results of others, such as those relating to acoustic signalling and leader gear, are even now being published, so that the benefits which research in those directions is bringing to the seaman may be more fully appreciated. It may not be generally known that an apparatus is already approaching the trial stage, which, when perfected, will give on a dial continuous indications of the depth of water beneath a ship, whether she is in motion or at rest. Those who know the labor, inaccuracy and delay which were inseparable from the old systems of wire sounding will understand what an enormous advance this achievement represents. One of the chief reasons among the many which led to the adoption of the Teddington site for the new laboratory was its central position with regard to important centers of research and scientific thought, its closeness to the National Physical Laboratory and to the headquarters of the director of scientific research at the Admiralty. During the war, a different policy was followed, and research stations were often hidden away in obscure and distant corners of the country, where their work might be carried on with the least fear of interference or observation. Though Teddington is not on the sea coast, there need, we are assured, be no fear that its work will drift away from the requirements of the navy, or that the thoughts of the workers will not be fully in tune with those of the sailor. Arrangements, we are glad to know, are being made whereby a constant exchange of information will be kept up between the existing naval experimental establishments at Portsmouth and elsewhere, and the director of scientific research and his staff, while naval officers are to be given opportunities for visiting the laboratory and seeing how the way is there being prepared for them in advance. Furthermore, it is the admirable intention to allow civilian scientists, who have perfected devices as far as possible in the laboratories, to visit naval ports and go to sea in order to supervise the initial trials of the devices which are the result of their efforts.

Intelligent observation of the papers and of the variety of the opinions which have been evoked by the publication of the Jutland reports, can only lead to one feeling, and that is one of uncertainty as to what the future holds for naval power. Capital ship or submarine? Gun or torpedo? No one can tell; but all who think will agree that we cannot longer rest secure

in our islands, relying only on the natural qualities of our seamen and our ships to protect us. It is our clear duty to help them by all those means that scientific knowledge alone can offer, and to give such facilities for research that we may be found ready and prepared for any of the great changes which to-day or to-morrow may bring forth.—*The Engineer*, Dec. 31, 1920.

THE NAVAL ENQUIRY.—*By a Sea Officer.*—A correspondent of the *Daily Chronicle*, which is usually regarded as a government organ, suggested last week, in an article on the work of the sub-committee which is investigating the proposed naval program, that if the report were adverse to the Admiralty proposals it would compromise the position of Lord Beatty as First Sea Lord and might result in his departure from office. Several highly important questions are raised by this suggestion, and it is as well to consider for a moment how the position stands.

In the first place, the sub-committee is not sitting in judgment upon purely naval proposals. According to the announcement of Mr. Chamberlain when it was appointed, the sub-committee is undertaking an investigation into the whole question of naval strength as affected by the latest developments of warfare. It has to decide, in effect, whether it is still necessary or expedient for this country to maintain its supremacy on the seas, or a position of equality with the next strongest sea power, or to be content with supremacy in Europe. Manifestly other factors than naval arise in the consideration of such a problem, and, this being so, it is difficult to see how a decision can affect the position of the government's naval advisers. The responsibility is with the cabinet, and if their decision is based chiefly, or even only partly, on considerations other than naval, it can scarcely be influenced by anything or anybody within the naval sphere. It would be totally different if only naval policy were involved, because in that case rejection of Admiralty recommendations would be tantamount to a want of confidence in the Board.

It is a well-accepted principle in regard to such matters that it is the function of the statesman to define the end and of the specialist to devise the means. If, therefore, the sub-committee—three out of the four working members on which are Cabinet Ministers, for Mr. Churchill is taking no part and Mr. Long appears to be too unwell to attend—recommend, and the cabinet concur, that it is no longer necessary for the country to be prepared to defend its coasts and commerce and maritime communications against all comers, then the responsibility of the Admiralty ceases in that respect. The late Sir Geoffrey Hornby, whose dictum every naval officer holds in respect, once put the matter very plainly, when he said that if asked to defend the Channel he would state what he required in the way of ships and men, because that was his business. If the government said the cost was too much, or decided for other reasons not to proceed with the defence, that was their business, and he had no ground for complaint. But if the government said he asked for too many ships and men to defend the channel he would be justified in refusing to proceed, for the strength of his force for a given task was solely his business, and the government knew nothing about it. The same rule applies to-day.

Another phase of the matter altogether concerns the wisdom of putting before the Committee of Imperial Defence a question which, while largely financial and political, also concerns such a technical matter as ship design. Mr. Balfour, than whom there is no higher authority on the committee's genesis and functions, said in 1905 that it would be in the highest degree inexpedient if it attempted to deal with matters which were strictly departmental he added:

"If the committee were to be treated as a Court of Appeal . . . . against the decisions come to in their own departments, either by the First Lord of the Admiralty or the Secretary of War, in the first place the committee would be hopelessly overburdened, and, in the second place, the efficiency

of the departments which it attempted thus to supervise would be destroyed, and the responsibility of the Ministers at the head of them would be absolutely shattered."

Curiously enough, in what now seems prophetic vein, Mr. Balfour said: "It is not for us to advise, much less to determine, what type of battleship, armored cruiser, or field gun should be adopted, or what military organization or naval distribution should be accepted by the government, by the House, and by the country." Mr. Balfour made the important qualification that where problems concerned neither army nor navy alone, but both jointly, a solution might be undertaken by the committee, as, for instance, in regard to the defence of ports by submarine mines. The army authorities favored these, the navy held the contrary view, and the committee agreed with the latter, but this decision did not lead to the resignation of the army board. The question now before the committee is admittedly interdepartmental, and affects all three arms, as well as having financial and political aspects of the utmost importance just now. There is no reason, therefore, why the Admiralty should feel aggrieved if the decision is not exactly that which they would in other circumstances have wished for. Lord Beatty and his colleagues will have done their duty in bringing the matter forward and having it thoroughly thrashed out.—*The Army and Navy Gazette*, Jan. 29, 1921.

NAVAL EXPERIMENTS.—In view of the very great and general interest being taken at the moment in naval matters, we think it well to refer again to a topic which is absorbing the minds of naval architects, engineers and others in most of the important countries of the world. Popular attention has been stimulated as much by the sharp differences of opinion that have been forcibly expressed as by the financial issues involved. The naval lessons of the Great War were of very considerable magnitude, but it must definitely be remembered that these lessons were very far from being so complete as to give rigid solutions to questions concerning the future results of combats between all the probable combinations of fighting forces at sea.

In order clearly to gain a perspective view into the future, not only should the lessons of recent naval actions be considered, but, due attention must be paid to the present position of the science and art of naval warfare, which is considerably in advance of that exemplified by the fighting machines involved in the Battle of Jutland. Subsequent construction has benefited by the experience there gained.

If, then, the present actual position be taken, the answer is probably correct that a battleship can be constructed which, when finished, will be able to withstand, with reasonable chances of successful issue, any attack that could be made upon it on the sea, from under the water or from the air, using the known and proved methods of offence and defence available today. But what are the future potentialities of the battleship, of submarines and of aircraft? The first is highly developed and the increase of offensive and defensive powers which it can hope to attain in the near future, even in the forecasts of the most expert minds, is somewhat limited, whereas, with under-water and aircraft the potentialities are undoubtedly much greater. Progress through evolution and invention must in the natural order of things be relatively rapid in these new fields of engineering endeavor, which are only as yet in their earliest infancy.

The problems, therefore, now before the Committee of Defence appointed by the government resolve themselves into firstly, a study of the international situation to ascertain whether machinery for naval defence in addition to, or in advance of, our present forces is called for, and if so, secondly to determine what steps should be taken towards such improvement or augmentation, and to formulate the extent of the additional provisions of defence deemed necessary. It may, of course, be assumed that some scheme will be formulated, but it is hoped that it will not be found

necessary to initiate such measures as would be burdensome to the country in its present financial position.

There are, then, defensive and offensive weapons to be considered. The whole history to date of naval warfare and the development of its machinery resolves itself primarily into a continuous struggle between the striking power of the shell and the resisting power of armor, with the balance sometimes in favor of the one and sometimes showing the other to advantage. To-day the contending forces are many times multiplied in number and are of a diverse character. The advances in the power of explosives have been rapid, and the limiting conditions have changed. It is submitted that while the records of the war are complete and are most informative, they require substantial confirmation and further expansion by a series of carefully-conducted experiments and trials on a scale sufficiently large to ensure definite results, whether positive or negative.

Many torpedoes in the war missed their mark, because of having insufficient speed to prevent the enemy from maneuvering out of the line of attack. To what extent can this speed be increased and the striking power of the torpedo intensified? What is the accuracy of fire with aerial torpedoes from the air? If it is of a high order, how can battleships or purely surface ships be adequately protected against damage to the vital organs through the easy access by way of funnels and uptakes? Must not the design of the means of emitting the waste gases from large surface fighting ships be entirely re-designed in view of the possibility of successful surprise attack from the air?

Aircraft as a defence against air attack form a known quantity. Can means be devised whereby a capital ship can use them, as a weapon, so that they can return to their floating base and land there without necessitating the stopping of the ship to pick them up from the water?

There is no type of war vessel so limited in power and size as the submarine. This statement is made quite apart from considerations of the necessity for certain types to operate in shallow water. High surface speed can be gained at the expense of submerged power, and conversely. In the case of the famous British *K* boats a surface speed equal to that of the battle fleet they were accompanying, was achieved, but when the battle ground is reached such craft require to submerge for safety, being much slower than destroyers and more vulnerable in consequence. The time for accomplishing the dividing operation is to some extent proportional to the displacement and surface speed, and so constitutes a weakness in the case of these large and fast craft. The submerged speed is only a fraction of that of the fleet, and therefore such submarines would in practice probably be constrained to fall out of the main action. Moreover, the depth charge is a very powerful weapon against submarines. This difficulty of the low submerged speed of submarines having a high speed on the surface would, if surmounted, give to this type of craft a very much greater importance than it has to-day, and resolves itself again into the necessity for research in the great field of prime movers.

Unquestionably the Diesel engine possesses many great advantages in principle when considered for the propulsion of war craft. These have been, if anything, over emphasized in the past, yet, progress is steadily being made, and the latest news that successful trials on shore have been carried out abroad, with a six-cylinder submarine engine developing some 400 brake horsepower per cylinder on a total weight of 44 pounds per brake horsepower, marks an advance on the best results in the past. The large German engines, it will be remembered, only developed 300 brake horsepower per cylinder as a maximum on a considerably greater weight than that just quoted. The longed-for internal-combustion turbine may possibly appear on the horizon. News from Germany shows that this type of machine is being investigated there. The very nature of this problem, however, suggests that its solution will come in two stages, the first by way of the enunciation of some new principle of heat utilization and the second,

by the invention of means and the discovery of materials which will enable the principle to be put into successful operation. There may be much lapse of time between the accomplishment of these two suppositious stages, yet this issue cannot be overlooked. In any case these reports emphasize the necessity for considering seriously the many problems which arise, bearing in mind the rapidity with which we are moving in these new fields of engineering development.

Considering even the type of marine machinery best suited at present for high power production on a limited weight there are still many links in the chain, from fuel combustion to power output at the propeller, upon which little improvement has been made for some years. Are these incapable of advancement if subjected to the searching and analytical light of modern scientific methods?

The navy in the past has relied chiefly upon private enterprise to carry out the necessary experiments in prime movers, and this system has worked well. It must, however, be supplemented to-day by Admiralty-conducted experiments. The reasons calling for a change in procedure are the altered conditions which operate at the present time, as has been pointed out by Sir George G. Goodwin in the chapter contributed by him to the last issue of *Brassey's Naval Shipping Annual.*

It must be recorded that a certain amount of work has been done in this direction in the past, and is still being pursued, notably at the Admiralty Engineering Laboratory. Much more, in our opinion, is, however, required. Firstly, to give a more definite aim to such work, in the light of all the advances in science made to date, and, secondly, to enable the lines of work indicated to be more swiftly and rigorously pursued.

Many such advances as would no doubt be made, in the direction of the expansion of knowledge of scientific facts, or in the happy event of invention and discovery crowning such research, would have a bearing, remote may be in some cases, on the trend of commercial operations. This has been so often the case in the past, as, for instance, with watertube boilers, mechanical gearing, thrust blocks, etc., that it is quite unlikely that naval engineering will now branch off into an entirely different channel from the paths which mercantile marine engineering must follow. Thus the added advantage of commercial gain may legitimately be put forward as an additional and strong plea for a generous consideration of the proposed line of action of naval experiment and research.—*Engineering,* Jan. 21, 1921.

AMERICAN SHIPPING.—If sea interests are accepted as furnishing the chief reason for naval power there would be no difficulty in proving Britain's need of an overwhelming navy. According to the latest issue of *Lloyd's Register,* the mercantile tonnage under construction in the United Kingdom at the end of last year was 3,708,916 tons, or rather more than half the total figure for the whole world. We have caught up with and passed the United States, and it does not look as though that country will regain the temporary lead which her great shipbuilding spurt won for her during the war. There has been, in fact, a very substantial decrease in the output of American tonnage since the close of 1918, the reduction amounting to nearly 70 per cent, while at the same time a large part of the American merchant fleet has been laid up. Only last week the United States Shipping Board announced its intention to withdraw from service and lay up an additional thirty ships, representing 180,000 tons gross. What with high wages, colossal running expenses, and falling freights, shipowners across the Atlantic find it increasingly difficult to carry on, and the bright dreams of an American sea-carrying monopoly have long since faded away. If the process of shrinkage continues at the present rate the United States may find itself some years hence in the anomalous position of owning the world's largest navy side by side with a mercantile marine of insignificant dimensions. The British nation may justly feel gratified at having reestablished its former shipping supremacy, but it is to be feared

that the decline in American tonnage power will coincide with a German revival in the same direction, a change by no means to our advantage. Not much has been heard of late about the German-American shipping alliance concluded at the instance of Admiral Benson on the one hand and the directors of the Hamburg-Amerika Line on the other. This compact does not seem to be altogether popular in the United States, many shipowners declaring that the Shipping Board has gratuitously subsidized America's most formidable rival.—*The Army and Navy Record*, Jan. 26, 1921.

SHIPPING STATISTICS.—The various shipbuilding companies have issued their shipbuilding statistics for the year, and they form interesting reading. Although many factors have militated against a big output, yet the average has been well maintained, and on the Tyne a substantial increase is shown over the figures of last year. The total output on the Tyne is 349,266 tons, compared with 274,649 in 1919, and 357,360 in 1914. Messrs. Swan, Hunter and Wigham Richardson head the list with 79,630 tons, compared with 62,020 in 1919, and are followed by the Northumberland Shipbuilding Company, who have advanced from 44,480 tons in 1919 to 61,691 tons. Messrs. Hawthorn and Leslie show an increase of from 14,857 tons to 34,002 tons; but Armstrong, Whitworth and Co. have a less output, their figures for 1919 being 43,250 tons, compared with 41,229 tons this year. The Wear continues to be a serious rival to the Tyne, and the output—333,335 gross tons, representing 67 vessels—is only short of the Tyne figures of about 16,000 tons. Had it not been for the tug boatmen's strike, of course, and the accident at Messrs. Swan, Hunter and Wigham Richardson's yard which prevented the launching of the *Laconia*, the output on the Tyne would have been greatly increased, and would easily have exceeded that for 1914.

It is proposed to form a Joint Committee of Employers and Employed on Tyneside in connection with the National Alliance of Employers and Employed, for the purpose of assisting to promote a reasonable and good understanding between employers and workmen on all industrial matters. Several of the local trade union delegates are taking an active interest in the proposal which is all to the good.—*The London Journal of Commerce Weekly*, Dec. 23, 1920.

JAPAN

PREMIER HARA'S DEFENCE OF JAPAN.—As a government official it is very difficult for Premier Hara to publish his views, he tells us, so that he expressly stipulates in the Tokyo *Chuwo* that he signs his article defending Japan against the charge of militarism solely in his capacity as "one of the Japanese subjects." That an official of the Japanese Government should publish a signed statement, we learn from the Far Eastern press, is almost without precedent; and that the premier should do so is not considered as establishing a precedent, but rather as an indication of the effect on the Japanese mind produced by so much clamor against Japan's alleged militarism. This, among the many misunderstandings entertained by foreigners about Japan, says Premier Hara, is "due to lack of study." Many criticisms of the Japanese are much to the point, he admits, and "may be taken as useful advice to improve ourselves." But, in the main, criticisms of Japanese national characteristics are not properly founded, and, Mr. Hara proceeds:

"Japan has no record in her history of having conquered other races, as everyone knows. The foreign wars in the Meiji era, especially the Russian War, were simply wars for self-defense against foreign aggression. In how difficult a defensive position Japan was placed in the Russian War the intelligent men of England, who financially and diplomatically supported Japan, and the intelligent men of America, who officiated in bringing about peace, should know full well. As the result of the war with Russia, Japan came to control Korea, Saghalien, and Manchuria, which was recognized

by the powers as necessary to remove the root of evil and ensure peace in the Orient. The powers then heartily supported Japan's move."

Because Japan's history is rich in records of warfare, Mr. Hara goes on to say, it is a great mistake to conclude that the Japanese people are an "entirely warlike race." The wars of Japanese history have been "political wars," and in the days before civilization had progressed, "political and military wars were employed for the same purpose by all countries which are now civilized." He then points out that—

"In Japan these wars were fought when men in power lost the confidence of the people and new men of power rose with popular confidence back of them to replace the old. While different in form, in the essentials the government by public opinion as it is now called had been in practise in Japan from olden times. For instance, when the Soga family lost its power, it was replaced by the Fujiwara family, and the Fujiwara were replaced later by the Tairas and the Tairas in turn by the Genjis. One family or faction could not monopolize power very long. According to the degree of wisdom and power of the people in each period, the government of democracy was really conducted."

The second misunderstanding about Japan, according to Premier Hara, is that she is "selfish" and promotes her own interests regardless of the interests of other nations. So her critics cry that Japan's development is "a menace to the world and that her development is undesirable." This charge also is "astonishingly wrong," declares Mr. Hara, who confesses that he cannot discuss in detail each and every accusation against the Japanese, but will meet some of them:

"I confidently believe that the charges described in the foregoing paragraph represent biased views of a very small minority. The majority of intelligent persons in Europe and America do not entertain such views. We need not refer to ancient illustrations. Regarding the attitude of Japan in the European War, we want a fair judgment rendered by foreign critics. . . . .

"Had Japan, for her self-interests, disregarded the mutual safety of the Allies and indulged in cunning tricks, unexpected results might have been created. That is a self-evident truth. Yet Japan has never resorted to such tricks. She went resolutely and unflinchingly to the cause of victory for the Allies, thus engaging in the preservation of the world.

"Japan has never violated international laws or international faith. She has been rather too timid to do so, or too inexperienced for it. In other words, she has not yet been degraded to that extent. If there is any fault to be found with the Japanese, it may be, as critics at home tell us, that Japan is too modest and reserved. In respecting international obligations and in being loyal to friendly nations, there perhaps is no country which will surpass Japan, though many nations apply the same principles of moral conduct between nations as between individuals.

"To be sure, we cannot say that there has been no cause for misunderstandings as regards affairs with China in the past, but that was a question of the ability of the men in power at the time. It was not due to any of the traditional principles of Japan. That the result of the deals with China were not such as a section of Americans have understood them to be, is a matter which has now been brought home clearly to the people of the world. Of that I am firmly convinced."

In sharp contrast to the foregoing is the statement of a contributor to the London *Quarterly Review*, that, owing to the success of the militarist party in Japan during the past twenty-five years, "the mass of the nation is intoxicated by the glamour of arms," and is proud to style the land *gunkoku*, or "war country." The wiser heads in Japan are not deceived by this "dizzy progress," and the London *Quarterly's* contributor quotes Dr. Yoshino Sakuzo, a leader of the Tokyo intellectuals, as saying in January, 1920, the following: "I am glad that there are an increasing number of men who think that all these Chinese and Korean troubles are

the results of a mistaken policy pursued in the past, and that nothing short of a fundamental reversal of that policy will be of any avail in solving the difficulty." The "old pacifist opposition has by no means faded away," and the defeat of Germany has "strengthened the hands of the moderates," savs the London *Quarterly's* contributor, who proceeds:

"However that may be, Japan, at the beginning of the greatest war in history, was one of the most martial-spirited nations in the whole world and was governed by a militarist oligarchy. Yet the part she played in the war was smaller than that of any of the belligerents, except the South-American Republics and China; and the interest taken by Japanese in the great events of Europe was so detached that it became a commonplace to brand them as pro-German. But apart from her obligation to the Alliance, there was one reason why Japan could not possibly stand aside altogether from the conflict. That reason was China. China is almost always the reason for any move in Japan's foreign policy. Japan, like a bustling, energetic planet, swings in a constant orbit round that inert, incongruous luminary which is China with its riches, its treasures, its huge population, and its immense possibilities. A strong policy for Japan means a strong policy in China. Militarism in Japan means aggression against China. The large and well-equipped Japanese Army is maintained to overawe China; and the admirable and growing navy exists to keep communications with the continent intact. China supplies iron in a quantity essential for Japan's existence, and an increasing provision of cotton and wool; and she is the principal market for Japanese manufactures."

Without any doubt, the more enterprising statesmen of Japan believe that the future of their country is "a future of domination in China," and this informant says this means—

"That Japan will one day control China's armies, arsenals, railways, mineral resources, police, finance, and customs administration; that she is called upon to play in this huge country the rôle which England has played in India; and that in the liberation of Asia from the white oppression in China will be her 'splendid second.' The European War meant to Japan her first opportunity to play a lone hand in China. To Japan, this was not the war of the German supremacy, but a third chapter in the war for Japanese supremacy in Asia. The Chinese War of 1894 was the first chapter; the Russian War of 1904 was the second; and the war of 1914 was to Japan merely a sequel to the struggle for Port Arthur. China, not Europe, was her battlefield. Yuan Shi Kai, the President of the Chinese Republic, was here enemy, not William II. The fortunes of war in Flanders and in Poland were a secondary matter to her politicians. Peking, not Berlin, was her objective; and it is the Chinese people who have had to pay for Japan's victory over Germany.—*The Literary Digest,* Jan. 22, 1921.

THE UNITED STATES AIRCRAFT CARRIER "LANGLEY."—The *Jupiter,* which is familiar to the public as one of our naval colliers, is now at the navy yard, Norfolk, undergoing alterations to refit her as a government carrier. She has been renamed the *Langley* in honor of Professor Samuel Pierpont Langley, whose extended pioneer experiments on the problem of mechanical flight made his name widely known.

All of the coal-handling gear has been removed and in its place there is being built a flying deck, located about 56 feet above the waterline and extending from bow to stern, a length of about 525 feet. This deck has a width, amid ships, of about 65 feet, and it will be flush all over, so as to make an ideal platform for flying off and landing. Means will be provided on this deck for rigging an arresting device to facilitate landing. Catapults for projecting the planes to give them the necessary speed for flight will also be provided forward and aft. An elevator will be installed for hoisting the planes from below to the flying deck and around this elevator a palisade will be provided to form a wind break for protection to the planes while being assembled.

UNITED STATES

NAVY DEPARTMENT—BUREAU OF CONSTRUCTION AND REPAIR

VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY—DEGREE OF COMPLETION, AS REPORTED JANUARY 31, 1921

Type, number and name	Contractor	Per cent of completion			
		Feb. 1, 1921		Jan. 1, 1921	
		Total	On ship	Total	On ship
Battleships					
44 California	Mare Island Navy Yard	95.5	94.7	95.2	94.2
45 Colorado	New York S. B. Cpn.	66.7	62.6	64.8	60.2
46 Maryland	Newport News S. B. & D. D. Co.	93.	92.2	90.	89.1
47 Washington	New York S. B. Cpn.	57.6	49.8	55.4	47.3
48 West Virginia	Newport News S. B. & D. D. Co.	44.5	33.2	41.2	29.2
49 South Dakota	New York Navy Yard	22.3	13.5	19.8	12.
50 Indiana	New York Navy Yard	18.2	9.4	14.8	7.1
51 Montana	Mare Island Navy Yard	16.6	9.5	15.9	8.3
52 North Carolina	Norfolk Navy Yard	21.8	13.4	19.8	12.1
53 Iowa	Newport News S. B. & D. D. Co.	13.1	9.2	11.9	8.6
54 Massachusetts	Beth. S. B. Cpn. (Fore River)	1.2	....	.7	....
Battle Cruisers					
1 Lexington	Beth. S. B. Cpn. (Fore River)	7.7	1.1	5.1	.5
2 Constellation	Newport News S. B. & D. D. Co.	5.1	2.7	3.6	2.1
3 Saratoga	New York S. B. Cpn.	13.3	6.6	11.3	5.6
4 Ranger	Newport News S. B. & D. D. Co.	1.	.4	9.	.3
5 Constitution	Philadelphia Navy Yard	2.3	.8	1.8	.6
6 United States	Philadelphia Navy Yard	2.3	.8	1.8	.6
Scout Cruisers					
4 Omaha	Todd D. D. & Const. Cpn.	88.4	80.1	84.4	77.5
5 Milwaukee	Todd D. D. & Const. Cpn.	79.	72.7	74.4	70.9
6 Cincinnati	Todd D. D. & Const. Cpn.	64 2	54.2	54.4	44.
7 Raleigh	Beth. S. B. Cpn. (Fore River)	42.2	26.3	35.6	20.7
8 Detroit	Beth. S. B. Cpn. (Fore River)	41.9	26.	34.7	19.8
9 Richmond	Wm. Cramp & Sons Co.	59.	....	58.	....
10 Concord	Wm. Cramp & Sons Co.	58.	....	57.	....
11 Trenton	Wm. Cramp & Sons Co.	39.	....	38.	....
12 Marblehead	Wm. Cramp & Sons Co.	37.	....	36.	....
13 Memphis	Wm. Cramp & Sons Co.	30.	....	28.	....
Miscellaneous					
Fuel Ship No. 18, Pecos	Boston Navy Yard	59.	57.	51.5	49.
Gun Boat No. 22, Tulsa	Charleston Navy Yard	49.9	35.9	43.8	32.1
Ammunition Ship No. 2, Nitro.	Puget Sound Navy Yard	99.8	99.2	99.7	98.8
Repair Ship No. 1, Medusa	Puget Sound Navy Yard	51.6	36.6	49.3	35,8
Dest. Tender No. 3, Dobbin	Philadelphia Navy Yard	49.3	49.	45.4	45.
Dest. Tender No. 4, Whitney	Boston Navy Yard	15.	4.4	7.5	3.
Sub. Tender No. 3, Holland	Puget Sound Navy Yard	7.8	....	7.1	....
Aircraft Tender, Wright	Tietjen & Lang	38.	....	25.	....

In addition to the above there are under construction 28 destroyers and 44 submarines.

There were delivered to the Navy Department during January, 1921, 3 destroyers and 1 submarine.

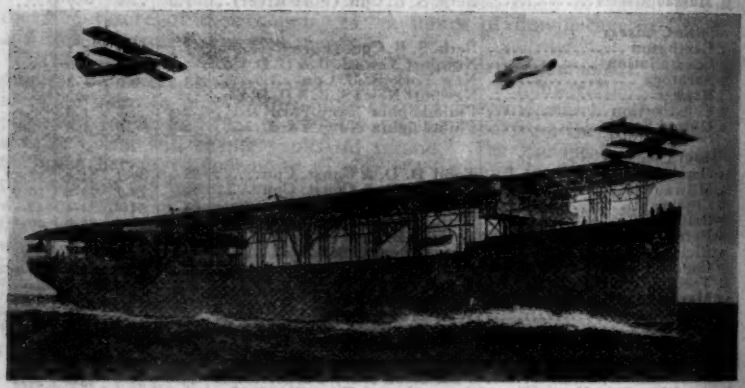
Authorized but not under construction or contract 12 destroyers, 7 submarines and 1 transport.

Two cranes with large outreach, one on each side of the vessel, will be provided to hoist aircraft out of the water and land them on the hangar deck, which is the deck next below the flying deck. Beneath the flying deck, traveling cranes will be provided for hoisting planes from the hold and for transferring them fore and aft to the shop spaces and elevator. Shop facilities for repairing the planes will include a machine shop, a wing repairing shop, molding spaces, a metal shop and various store rooms.

The hold spaces are being refitted for the stowage of aircraft and their accessories, including aircraft ammunition in the way of bombs and torpedoes, ship's ammunition, fuel oil and gasoline. An elaborate system will be provided for distributing gasoline and lubricating oils to various stations on the hangar deck and flying deck. The characteristics of the *Langley*, refitted as an aircraft carrier, are as follows:

Length between perpendiculars	520 feet
Length over-all	542 feet
Beam	65 feet
Speed about	15 knots
Displacement about	12,700 tons
Gasoline capacity	578 tons
Guns	4–5 inch

The smoke pipe has been rearranged so as not to obstruct the flying deck and to keep the smoke clear of this deck, in order not to interfere with



THE "LANGLEY" (FORMERLY COLLIER "JUPITER"); FIRST AIRCRAFT CARRIER FOR THE UNITED STATES NAVY.

Length: over-all 542 ft.; *Displacement:* 12,700 tons; *Speed:* 15 knots; *Armament:* four 5-inch guns; *Aircraft Complement:* 12 single-seater pursuits; 12 two-seater fire control; four torpedo planes; six seaplane torpedo planes.

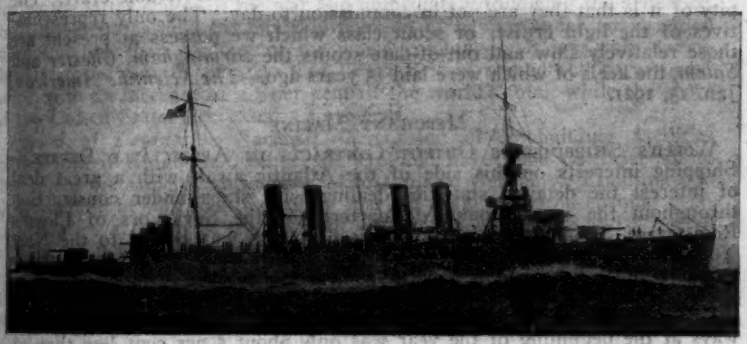
making a landing. This will be accomplished by providing a short smoke pipe on each side, clear of the flying deck, which will be interconnected so that the smoke can always be discharged on the lee side. One of the smoke pipes will be arranged to hinge downward when considered necessary to discharge the smoke near the water; the other is arranged to discharge the smoke downward through a water spray.

A radio outfit will be provided, carried on masts which are capable of being completely housed below the flying deck. The *Langley* will carry an

auxiliary radio outfit, so that the planes can be communicated with when the main radio outfit is housed.

The *Jupiter* as thus reconstructed under her new name of *Langley* will carry 12 single-seater pursuit planes capable of maintaining a speed of 100 knots for three hours; 12 two-seater fire control planes capable of cruising for four hours at an elevation of 10,000 feet and having a full speed of 100 knots; four torpedo planes capable of flying at 100 knots for two hours, and six seaplanes built as torpedo planes capable of 80 knots' speed for four hours.

THE UNITED STATES LIGHT CRUISER "OMAHA."—An important section of the three-year program which was drawn up before we entered the war was the provision for 10 scout cruisers, a comparatively new type of vessel, at least as regards its steaming radius and high speed. The most notable features of our new designs as compared with those of contemporary navies was their high speed of 35 knots, their large displacement of 7100 tons, and their battery of eight 6-inch guns.



NEW SCOUT CRUISER "OMAHA"—CLASS OF TEN SHIPS.

Length: 555½ ft.; *Beam:* 55 ft.; *Draft:* 13½ ft.; *Speed:* 33¾ knots; *Armament:* twelve 53-caliber 6-inch guns; two twin, 21-inch torpedo tubes.

Since the designs were first drawn up, modifications have been made in the direction of increasing the strength of the hull and the power of the battery, and this has resulted in an increase of the displacement from 7100 to 7500 tons and a decrease in the speed to about 33.75 knots.

As will be seen from the dimensions, these vessels, so far as the hull is concerned, are practically exaggerated destroyers; for with a beam of 55 feet and a mean draft of 13 feet 6 inches, they are 556 feet 6 inches in length over-all, giving a ratio of beam to length of one to ten. When the designs were first brought out, some fear as expressed as to whether their shallow depth, as affecting their girder strength, would not cause them to strain heavily when steaming head to sea; but from the official drawing from which our own wash drawing has been prepared, we gather that the freeboard for over one-third of the length amidships has been raised one deck. If so, this will give greater strength and add both to their seagoing qualities and to their appearance. There is a pronounced sheer with considerable lift toward the bow, which, even as it is, will be none too lofty if these boats are to be driven at nearly 34 knots in average

weather. The motive power as originally designed consisted of geared turbines operating on four shafts with a combined shaft horsepower of 90,000.

The battery will be numerous and powerful, consisting of 12 of the new-pattern 53-caliber 6-inch guns. It will be mounted as follows: On the forecastle deck will be a two-gun turret, abaft of these on each side of the bridge will be two guns mounted in superposed sponsons, all of these six guns being forward of the bridge. Aft will be a similar arrangement of six guns, namely, a two-gun turret well aft on the quarter-deck, and forward of this, on each side, two guns in superposed turrets, these latter being slightly aft of the after bridge.

An interesting novelty, at least in the United States Navy, is the adoption of the British tripod mast, at the head of which is located a closed director-fire position, from which the fire of the battery of twelve 6-inch guns will be controlled. A secondary battery will consist of two 3-inch, 50-caliber aircraft guns and two 3-pounder saluting guns. The vessels will also carry two 21-inch twin torpedo tubes which will be located on either beam on the main deck between the aftermast funnel and the main fast. The boats will be liberally supplied with searchlights and range finders.

Altogether these vessels should prove to be very serviceable craft. The pity of it is that they are not in commission to-day. The only representatives of the light cruiser or scout class which we possess at present are those relatively slow and out-of-date scouts the *Birmingham*, *Chester* and *Salem*, the keels of which were laid 15 years ago.—*The Scientific American*, Jan. 15, 1921.

MERCHANT MARINE

WORLD'S SHIPBUILDING OUTPUT CONTRACTS IN APPRECIABLE DEGREE.—Shipping interests on this side of the Atlantic await with a great deal of interest the detailed statistics dealing with ships under construction throughout the world compiled quarterly by the Surveyors of Lloyd's Register of Shipping, a brief synopsis of which was cabled to the New York office of the society this week.

While there has been a general contraction in new ship construction orders not only in the United States and Great Britain, but throughout the entire world during the past few months, the aggregate tonnage on the ways at the beginning of the year was only about 5 per cent less than at the beginning of October, 1920, according to Lloyd's report.

It considers that, although the decrease is small it may prove to be the beginning of a decline as rapid as the increase which occurred since 1918, and emphasizes the fact that the tonnage completed is only 13 per cent of the total under construction at the beginning of the quarter, as compared with 23 per cent in pre-war times. The following condensed statistics were received by cable at the offices of the society, No. 17 Battery Place, where the full report is expected by mail soon:

SHIPPING CONSTRUCTION COMPARED

	Dec. 31, 1919	Dec. 31, 1920
United States	2,966,000	1,310,000
United Kingdom	2,994,000	3,709,000
Other Countries	1,901,000	2,160,000
World's Total	7,851,000	7,179,000

In so far as the figures grouped under the general designation of "other countries" are concerned, it is stated at Lloyd's that these are only approximate as accurate returns from Germany are not available at this time. It is remarked, however, that in smalled maritime nations, there is at present under construction a quarter of a million tons more of shipping than a year ago. France and Holland both show substantial gains in the amount of shipping now under way.

British Construction Declines.—For the first time since the war period, British shipbuilding shows a decline. The recession is only a small one, however, there being 3,709,000 gross tons in hand at the end of 1920, compared with 3,731,000 tons at the end of September, 1920. This decrease of barely 22,000 tons is overshadowed by the well-nigh staggering decrease of nearly half a million tons which the statistics for American shipyards show.

Construction in France increased from 293,000 tons to 397,000 tons while the gain noted in Holland for the quarter has been from 424,000 tons to 450,000 tons. These gains, however, have been offset somewhat by decline elsewhere. Italy has suffered least from the depression, the falling off amounting to barely 2000 tons.

As a result of changed conditions, more than one-half or 51.6 per cent of the world's shipbuilding is now under way in the United Kingdom as compared with a little more than one third, or 38.1 per cent, at the beginning of 1920. In the same period, the United States' share in the total has decreased from 37.7 per cent to 18.2 per cent.

During the period of intensified shipbuilding campaign in this country during the latter stages of the war and immediately following the armistice, the United States held the enviable position of having under construction more shipping than the rest of the world combined. It was only during the last three months of 1920 that Great Britain passed the 50 per cent mark, with an increase of 2.3 per cent of the world's total, while the share of the United States decreased 5.2 per cent.

Period of Depression Forecast.—Expansion of shipbuilding facilities in the United Kingdom, France and Holland have gone on apace up to this, while the same condition is said to apply to Germany. Conditions in Great Britain at this time indicate a marked change for the ensuing year, as deliveries are now at the point of exceeding new orders and a period of depression in the industry is forecast by leading authorities.

This general slowing up in the work is shown by the fact that in the quarter ending December 31, 1919, new steamers on which work was begun in the United Kingdom represented a total of 601,000 tons while launchings for that quarter represented only 451,000 tons. In the third quarter of 1920, new work aggregated 591,000 tons, while launchings were 478,000 tons and for the last quarter of the past year, new work begun totalled only 503,000 tons, while launchings represented 576,000 tons. Of Great Britain's total tonnage now under construction, fully one-third is for purchasers abroad.

Internal combustion engines are bound to play an increasingly important part in modern shipping as is indicated by reports to Lloyd's Register of Shipping which show that 454,000 tons of motorships are being built in the world at present. The greater part of this construction is in the United Kingdom, Holland and in the Scandinavian countries, while reports from Germany are to the effect that this class of craft is growing in favor.

Tank steamers under construction at the beginning of the year aggregated 169 of 1,169,003 tons, of which 88 of 637,100 tons were building in the United States; 64 of 422,533 tons in the United Kingdom, and 17 of 109,370 tons in other countries. This compares very favorably with a total of 795,000 tons of this class building at the end of September, 1920, of which 545,000 tons were under construction in the United States; 232,000 tons in the United Kingdom and 18,000 tons in other countries.—*The Nautical Gazette*, Jan. 15, 1921.

WORLD'S TONNAGE BUILDING ON FIRST OF YEAR.—According to Lloyd's shipbuilding returns, the tonnage under construction in the different coun-

tries of the world, with the exception of Germany, at the close of 1920 and 1919 was as follows:

	Gross Tons	
	1919	1920
British Dominions	186,655	251,480
Belgium	28,048	26,293
Brazil	3,768	.....
China	53,624	35,700
Denmark	121,279	100,335
Esthonia	1,100	.....
Finland	5,150	.....
France	397,969	216,775
Greece	1,500	1,500
Holland	450,964	328,338
Italy	363,784	314,547
Japan	248,513	309,474
Norway	83,928	92,719
Portugal	2,350	5,210
Spain	89,340	107,463
Sweden	122,578	107,765
United Kingdom	3,708,918	2,994,249
United States	1,310,312	2,966,515
	7,179,780	7,861,363

—*The Nautical Gazette*, Jan. 29, 1921.

WORLD'S SHIP OUTPUT IN 1920.—The United States led the world in the total of gross tons of merchant vessels launched in 1920, according to figures compiled by Lloyd's Register of Shipping.

The total launchings in shipyards of the world amounted to 5,861,000 gross tons, a decrease of almost 1,300,000 from the 1919 figure, but an increase of more than 400,000 over 1918.

Lloyd's points out that at the beginning of 1920 the United States and Great Britain had on hand virtually the same amount of construction to be completed, and credits American yards with greater speed than those in Great Britain, in that this country exceeded England's total by 20 per cent. The decline in the total world tonnage launched was attributed to the decline in the American shipbuilding program. America's launchings being 1,600,000 tons less than in the previous year. British production showed a gain of more than 400,000 tons. Other countries launched a total of about 1,330,000 tons during 1920, or about 20,000 tons less than in 1919.

The yearly output of the United States and the United Kingdom in launchings since before the war is shown in the following table, the figures being in gross tons:

	United States	United Kingdom
1913	276,000	1,932,000
1914	200,000	1,683,000
1915	177,000	650,000
1916	504,000	608,000
1917	997,000	1,162,000
1918	3,033,000	1,348,000
1919	4,075,000	1,620,000
1920	2,476,000	2,055,000

In comparison with pre-war figures, launchings in the United States were nine times as great as in 1918, and throughout the world there was a gain of about 75 per cent. For the first time since the beginning of the

war Great Britain last year exceeded its 1918 figures, the gain being about 7 per cent.

Considerable gains over 1919 were shown by France, which increased the total of its launchings to 98,000 tons last year; Holland, to 188,000 tons, and Italy to 133,000 tons. Figures for Germany were not available.

Lloyd's figures show that the United States far outstripped the rest of the world in construction of tanker tonnage. This country launched 567,000 gross tons of this class of vessels; Great Britain, 65,400 tons, and other countries, 8000 tons.

Of the vessels launched last year 32 were of 10,000 gross tons or more.

During 1920 there were launched in the world 190,000 gross tons of vessels fitted with internal combustion engines.—*The Nautical Gazette*, Jan. 29, 1921.

1920 GREATEST YEAR IN HISTORY OF NEW YORK HARBOR.—During 1920 no fewer than 10,986 ships of 35,829,149 net tons entered from or cleared for foreign destinations, according to port statistics of New York, which recently have been compiled.

This number of vessels exceeded by more than 1000 the record attained in any pre-war year and outdid by 23 per cent the showing of 1919. The greatest net tonnage recorded for New York during the years prior to the World War was approximately 14,000,000 tons.

Following is the record of the monthly entrances and clearances for the past year in the foreign trade:

Month	Entrances		Clearances	
	No. ships	Net tonnage	No. ships	Net tonnage
January	372	1,143,126	410	1,450,778
February	377	1,174,913	330	1,054,269
March	440	1,322,013	410	1,369,829
April	431	1,302,177	386	1,243,000
May	444	1,343,052	390	1,258,996
June	508	1,545,144	436	1,364,297
July	510	1,627,721	462	1,518,406
August	537	1,634,719	499	1,649,416
September	506	1,728,266	493	1,574,228
October	526	1,763,904	514	1,719,103
November	495	1,717,795	482	1,673,685
December	516	1,732,485	518	1,802,929
Total	5,662	18,068,306	5,324	17,760,843

The excess of entrances over clearances is due to the laying up of a large number of vessels at this port and to others being placed in repair yards for reconditioning.—*The Nautical Gazette*, Jan. 15, 1921.

LAST SHIP BUILT AT HOG ISLAND.—Shipbuilding at Hog Island, Philadelphia, once the world's greatest shipyard, ceased January 27, when the army transport *Aisne* was turned over to the Emergency Fleet Corporation. Early next month the American International Shipbuilding Corporation will turn the yard over to the United States Shipping Board. The *Aisne* is 448 feet long with a displacement of 13,400 tons. Her contract speed is 15 knots an hour.

Hog Island was created as a war emergency. At one time it employed more than 36,000 men and women. The first keel was laid at the yard February 12, 1918, and since then 122 vessels of a total of 856,750 deadweight tons have been turned out.—*The Nautical Gazette*, Jan. 29, 1921.

INTERNATIONAL MERCHANTILE MARINE'S PECULIAR STATUS.—Aroused by the charge of Senator Wesley L. Jones that the International Mercantile

Company was precluded from properly furthering the interests of American shipping because of its being obligated by a contract made with the British Government in 1903 not to pursue a policy injurious to the British Merchant Marine or to British trade, the Shipping Board last week began a formal investigation into the status of that corporation. The hearing thus far held has revealed nothing new. Of the 1,015,000 tons of shipping owned by the company or its affiliated concerns, only 13 per cent is of American registry. More than five-sixths of the total tonnage controlled is under the British flag and cannot be removed from under the red ensign except with the consent of the British Government, which thus far has been refused except in one or two isolated instances. The title to these boats is in English subsidiary companies, the capital stock of which is almost entirely owned by the American incorporated Mercantile Marine Company. While the operations and disposition of the ships of these English affiliated companies is controlled by the British Government, British interests have no voice in the management of the parent Mercantile Marine Corporation, 94 per cent of whose stock is owned in the United States.

Although laying claim to the title of the premier American steamship concern, the International Mercantile Marine Company owns seven times as much foreign as American tonnage. Since its formation it has steadily developed its fleet of British ships and has acquired very little American tonnage. It is in the unfortunate position of being regarded with suspicion in British shipping circles on account of its New Jersey domicile and of being assailed in the United States as un-American because of its relations with foreign shipping interests. In order to end this anomalous situation, the Company in 1917 attempted to dispose of its holdings in British steamship enterprises for $135,000,000 with the idea of investing the sum named in American vessels. But this plan was first held up by the Shipping Board and then rejected by the Mercantile Marine stockholders on the ground that the price offered was inadequate.

The question the Shipping Board will now have to decide is whether the ownership of a large amount of alien tonnage subject to the control of a foreign government disqualifies a shipping company from being considered thoroughly American and entitled to the allocation of government ships. This is a matter which should be looked into carefully. Any ruling to the contrary would be a new departure, for it has not been considered improper heretofore for American steamship companies to own vessels flying foreign flags. Within the last two years the United Fruit Company has had certain passenger and cargo boats built in British yards, which vessels have retained their British registry without objection on the part of anyone. This practice of American shipping interests owning foreign tonnage has not proven detrimental thus far to our Merchant Marine, but in view of the certainty of an intense rivalry for maritime supremacy between England and ourselves, companies with divided interests like the International Mercantile Marine may find themselves in not a happy position hereafter. In its present temper, the Shipping Board is not likely to give them the first call on whatever tonnage is to be allocated.—*The Nautical Gazette*, Feb. 5, 1921.

I. M. M.'s AGREEMENT PROBED.—At the inquiry held by the Shipping Board on Thursday of last week into the International Mercantile Marine Company's agreement with the British Government to pursue no policy injurious to the interests of the British Mercantile Marine or to British trade, Mr. P. A. S. Franklin, president of the company, testified that the clause forbidding the company to pursue a policy prejudicial to British trade applied only to its British registered tonnage. While there was a clause in the agreement providing that a majority of the directors of the company's subsidiary corporations in England must be British subjects, the Mercantile Marine Company elected the directors through its ownership of stock.

Mr. Franklin also testified that 94 per cent of the Mercantile Marine Company's capital stock was owned in the United States and less than one-half of one per cent in England. He denied that any British interests had power over the policies of his company. Of the 1,015,000 tons of shipping owned by his corporation, 85 per cent was under the British flag and 2 per cent under the Belgian. At the close of the hearing the Shipping Board was asked to suggest methods whereby the Mercantile Marine Company could meet the requirements of the Board and expand its services under the American flag.—*The Nautical Gazette*, Feb. 5, 1921.

AERONAUTICS

THE MISSION OF AIRCRAFT WITH THE FLEET.—Let us examine the mission of aircraft with the fleet. The following duties are those which should be performed:

1. Bombing enemy's battleships and bases. Attack with torpedo-plane.
2. Protection of own fleet from hostile aircraft.
3. Scouting.
4. Reporting on movements of enemy over smoke screens, in low visibility and over the horizon.
5. Detecting mine fields, torpedoes, and submarines.
6. Spotting.
7. Escort.

1. *Bombing Enemy's Men-of-War and Bases.*—All offensive action must be carried on by heavier-than-air craft until a practical non-inflammable gas is in use for lighter-than-air craft. At present dirigibles are easy targets, as one incendiary bullet will set them in flames. They must keep away from hostile aircraft.

Offensive action against surface craft was not of much use in the war, but will become increasingly important. The reasons for the limited number of successful air attacks on vessels were: Lack of opportunity, small size of bombs, poor bomb sights, untrained bombers, insufficient number of planes and material, and a poor development of aerial strategy and tactics.

Some good work was done against submarines, and one R. A. F. Squadron (No. 217) sank at least two German destroyers, using DHs, and only 230-pound bombs. A Handley Page squadron (No. 214) that was operating from our aerodrome at St. Inglevert was dropping 1650-pound bombs. They were loaded with about 1100 pounds of T. N. T., as against only 29 pounds for 14-inch A. P. shell. If heavy bombs were made armor-piercing, they would sink any but capital ships and undoubtedly put dreadnoughts out of action.

If hostile aircraft are to be encountered, the large bombers, seaplanes and torpedo-planes *must* be, and the two-seaters *should* be, convoyed by fighters for day work.

All "day bombing" should be formation work, and should be concentrated.

With the present inaccuracy of anti-aircraft fire from ships, bombers could go over as low as 4000 feet in the daytime. At night, both bombing and torpedo work are much easier, as surface craft can generally be seen in any but the darkest nights, whereas aircraft are invisible and could go over as low as 2000 feet.

Bombs must be suited to their objectives just as projectiles are. Against capital ships and concrete, the largest possible bombs should be used. As already stated 1650-pound bombs were used in the war, and 3300-pounders were being experimented with when the armistice was signed. Against light cruisers, destroyers and bases not under concrete, a number of smaller bombs would be more effective; the 230 and 520 were mostly used. Against personnel, a large number of small bombs with good fragmentation, such as the 20-pound Cooper, are the best.

For action against surface craft and land objectives, heavy case bombs should be used, as the destructive effect of the fragments is important; whereas against submarines, light case with a correspondingly larger amount of explosive should be used, as the force of the explosion is the only consideration. For both submarine and surface craft bombing, a delayed action fuse is necessary; in the one case to get under water, and in the other (coupled with a heavy armor-piercing nose) to get through the upper decks.

With the accuracy of our new sights and the application of proper tactics and material, the importance of the future of bombing cannot be overestimated.

2. *Protection of Own Fleet from Hostile Aircraft.*—As the offensive use of aircraft outlined in 1 is increased, there must be a corresponding increase in defense. There is no doubt that the primary defense against hostile aircraft is fighting aircraft of your own. These give a much greater protection than is possible with anti-aircraft fire, which for many reasons is not nearly as efficient from ships as ashore. Fighting aircraft not only protect vessels from direct attacks, but if in sufficient numbers and properly handled, should prevent the enemy's planes from carrying out any of their duties, such as scouting, escort, spotting, etc.

There was no general aircraft fight at sea during the war, for the reason that the British did not realize the value of planes with the fleet until after Jutland, and never had another chance. The Germans did not develop seagoing aircraft sufficiently to attack, and the zeppelins were too vulnerable.

Efficient fighting aircraft are at present single- and two-seater, light fast planes, but undoubtedly in the future there will be a large flying boat which will be armored around the vital parts, and will carry cannon as well as machine-guns. French flying boats are already carrying 3-inch guns. This craft will have no "blind spots," and will be able to put out such a volume of fire that no small fighter can get in on her.

Lighter-than-aircraft should make formidable fighters, owing to their stability and the heavy armament they can carry, but only after a non-inflammable gas is adopted.

3. *Scouting.*—For scouting and long-distance reconnaissance aircraft are far ahead of surface craft because of their great speed. We now have seaplanes with a radius of 1200 miles. It is easy to see the efficient work a squadron of such planes could do with their speed of 60 miles per hour, coupled with efficient radio work. Dirigibles are also valuable in scouting, but at present are more liable to be weather-bound than seaplanes, as the latter can now go out in nearly any weather.

For scouting near the fleet, say up to 150 or 200 miles, the two-seater bombing and fighting planes could also be used, operating from the carriers.

Many valuable reports as to the movements of the enemy were made both from lighter- and from heavier-than-aircraft.

4. *Reporting on Movements of Enemy Over Smoke-Screens, in Low Visibility and Over the Horizon.*—Reporting enemy's movements overlaps scouting, but reports when in contact or almost in contact with the enemy can be made by nearly any type of aircraft including heavier-than-aircraft, dirigibles and balloons. The great value of aircraft for this work was proved in many maneuvers in the Grand Fleet. Many times when the fleet was absolutely blinded, due to smoke, poor visibility or distance, all the information desired by the admiral was sent down from the air. Types of ships, formations, base courses, changes in base courses, etc., are easily seen. Radio telephones should always be used for all communication work up to their distance limit, and then radio telegraph. Visual signals are only secondary in case of radio failure.

5. *Detecting the Mine-Fields, Torpedoes and Submarines.*—In detecting mine-fields and submarines from aircraft, two factors must be considered: The clearness of the water and the condition of the atmosphere. Ability

to see under water varies with these two factors. Under the most favorable conditions, such can be found in the Caribbean, very clear water and a strong sun overhead, it is possible to make out a shape over 100 feet under water. In muddy water, such as the Chesapeake in the spring, nothing can be seen a foot under the surface, and under-water visibility varies between these two conditions.

In general, in blue water, mines can be picked up some fathoms under, especially if there is a bright sun behind, and submarines to a greater depth. Of course, submarines light or awash are easily seen and the V-wake from a periscope is visible a long distance in moderately smooth water.

The wake of a torpedo is easily picked up, and if the aircraft is connected with the ship control by telephone, directions for avoiding it are of great assistance.

For detecting submarines, mines and torpedoes, dirigibles and balloons are probably more efficient than heavier-than-aircraft, owing to their ability to stay in one place, and their greater ease of observation. A great deal of this work was done in the war by all three types of aircraft. Minefields and floating mines were reported frequently, and many submarines discovered and attacked or reported to surface craft.

6. *Scouting.*—It is thought that two new factors when properly developed will mean a great deal to gunnery in the fleet. These are the use of star shells at night and aircraft spotting by day. The former was developed by the enemy on the Belgian coast. Star shells as large as 8 inches were used both against aircraft and men-of-war. The latter was brought to a high state of efficiency for land work on the Western front, practically all efficient long-range shooting being controlled by aircraft.

The Grand fleet was using aerial spotting for long-range work and an efficiency of at least 300 per cent higher was obtained from aerial spots than from ship spots. Our latest 14-inch 50-caliber gun can shoot over 28,000 yards, and undoubtedly will open fire at at least 25,000 yards in the future. It is not believed that ship spotting can be accurate at over 18,000 yards, whereas aircraft spotting is efficient for any distance and is not affected by smoke screens.

Kite balloons have the great advantage of direct telephone communication, but the disadvantage of giving away your position to the enemy. They also have a bad whip when a salvo is fired, and cannot be used in bad weather.

Dirigibles seem the best aircraft for this work, using radio telephone, but they also are liable to be weather-bound.

7. *Escorts.*—Escorting surface craft and submarines has been one of the most important duties performed by aircraft. There were almost no cases of submarines attacking a convoy when there were aircraft present, as the German commanders always submerged when a plane was seen or heard. The Dutch and channel convoys, and, towards the end, the French coastal convoys, were nearly always escorted by planes as well as surface craft.

Dirigibles are more suitable for convoying than planes, owing to the greater ease with which they can remain over the convoy. This obtains always, provided no contact is made with the enemy's aircraft, when dirigibles would probably be shot down.

The Navy of the Future and Aircraft.—In England, R. Blackburn, the aeroplane designer and one of the foremost authorities on the subjects of torpedo-planes, has written a very interesting letter to *Flight*, as follows:

"In the recent controversy on the trend of naval development, widely-divergent views have been expressed. Some eminent authorities have asserted that all large surface craft should be abandoned owing to their vulnerability by torpedo attack, while others maintain that large ships can be built, doubtless at considerable extra cost, to safely withstand torpedo attack. It would appear, however, that these in their turn would

be endangered by the advent of larger torpedoes carrying a heavier explosive charge.

"In no case has the value of the torpedo as a weapon been questioned, and it is interesting therefore to consider the advantages which are claimed for aircraft over the other means which may be employed for delivering a torpedo attack, namely, small high-speed surface craft (ranging from motorboats to destroyers) and submarines.

"In attacking with the torpedo, as in all forms of attack, the element of surprise is of the utmost value. For this reason the submarine has an advantage over surface craft, in that it can approach close to its objective with little chance of detection until within short torpedo range. It pays a heavy price, however, for this advantage in its lack of speed and maneuverability. Its lack of speed confines its operations largely to lying in wait for enemy ships, and if its presence is detected its poor maneuverability gives the enemy a good chance of avoiding the torpedo by rapid changes of course. Surprise can rarely enter into an attack by surface craft; an approaching destroyer would be visible to the enemy in fairly clear weather for at least ten minutes before getting within extreme torpedo range, and except in the case of opposing ships steaming towards one another, for a longer period.

"Torpedo-planes flying at upwards of 10,000 feet can begin to glide with engine off, and therefore silently, some ten miles away, remaining invisible until within three or four miles and probably undetected until much closer. Gliding at say 120 knots it is unlikely they would be seen more than minute before launching a torpedo at close range.

"Thus the torpedo-plane shares with the submarine the advantage of getting to close range unobserved, but on the score of speed and maneuverability is not merely not inferior to its target, but has about four times the speed of a fast ship, and can turn in a time measured in seconds as compared with minutes. Moreover, with a fraction of the personnel of one submarine, a whole squadron of torpedo-planes can be provided to converge from all points of the compass, and so render maneuvers such as change of course almost useless.

"The facility of getting to close range has not only the advantage of surprise, but also implies a much higher percentage of hits than can be hoped for with surface craft. When torpedoes are launched at a range of several miles, it is necessary in order to score a hit to estimate correctly the speed and course which the target will maintain or take up for some five minutes after the torpedo is discharged, and as change of course is commonly resorted to when a ship is attacked by torpedo, the percentage of hits to be expected is comparatively small.

"From the point of view of cost both as regards personnel and material, aircraft can claim a marked advantage. A flotilla of destroyers costing £300,000 or £400,000 each, and carrying 70 or 80 men each, would only in a heavy engagement average ten torpedoes discharged per ship. This would imply some seven or eight men and thirty or forty thousand pounds' worth of material employed and endangered for each torpedo fired. In the case of aircraft, there is only one man and a machine costing about five thousand pounds engaged for each torpedo fired. The implied assumption that each torpedo-plane risked has an opportunity of discharging its torpedo is justified because it is not visible, and therefore not endangered, until within striking distance; moreover, every ship sighted, or whose position is signalled by wireless, presents an opportunity to a machine having a speed some 70 or 80 knots superior to that of any ship.

"On the score of comparative results for the same cost, it is interesting to imagine what would have happened if in the Battle of Jutland our destroyers had been replaced by torpedo-carrying aircraft of the same monetary value, some part of the ships of the line being used as carriers. If there were a hundred destroyers employed, costing, say, thirty-five

million pounds, with crews aggregating 7000 men, torpedo-planes could have been provided to the number of 7000, which represents not less than 30 torpedo-planes to every ship in the German Fleet. The cost would have been the same, and the number of men endangered would have been the same, but whether any German ship would have returned to its harbor is another question."—*Flying*, February, 1921.

A NAVAL AIR SERVICE.—A thoroughly equipped, well-organized air service for the navy is imperatively demanded. The best authority in the United States on the subject makes the following estimate of the material for an adequate air force to cooperate with our battle fleet:

A

120 Torpedo and bombing planes, at $40,000	$ 4,800,000
70 Planes for long distance overseas scouting, at $40,000	2,800,000
97 Fighting planes, at $10,000	970,000
90 Spotting planes, at $12,000	1,080,000
6 Rigid dirigibles for long overseas reconnaissance, at $2,500,000	15,000,000
21 Non-rigids, at $100,000	2,100,000
50 Kite balloons, at $5,000	250,000
Total	$27,000,000

B

To provide hangars and shops, flying fields and other facilities necessary for operations and experimental work	$25,000,000

C

For maintenance	$10,000,000
Grand total	$62,000,000

It is to be noted that in order to maintain this number of planes from year to year, and to provide for progressive experimental work, Items A and C would have to be appropriated for yearly, $37,000,000.

Referring to this subject, an officer of high rank who has made an exhaustive study of modern naval warfare makes the following statement:

"If we had the strongest battleship fleet in the world it could not operate against any other country that is supplied with even a reasonable number of aeroplane carriers, with fighting and torpedo-planes. There are no means of resisting an attack from the air except by air forces. The one having the control of the air over the field of action will be the first to get its torpedo-planes against its enemy, and it is as easy to torpedo a battleship as it is to torpedo any other vessel. No reasonable number of battleships would be of any use to us unless they have their necessary auxiliaries."

This statement challenges contradiction. From abroad we have evidence of great improvements in Admiral Fiske's torpedo-plane—its deadliness against battleships has been demonstrated.

Manifestly another necessary "auxiliary" of the battle fleet is the submarine force. The surface, the submarine and the air forces must be co-ordinated to form a modern fighting fleet—it means a three-plane navy.

If the 1916 building program is not revised to meet conditions in 1921, Congress will seemingly be responsible for spending more billions for a fleet that cannot fight successfully under modern war conditions on the sea.—*Editorial in N. Y. Tribune.—The Aerial Age Weekly*, Jan. 24, 1921.

NAVAL AVIATION.—There is no bureau of naval aviation at the Navy Department, no control office, no one directing head having authority and

responsibility for the organization and development of an air force for the navy. Until such a bureau is established, it will be obviously impossible for the director of aviation to make headway. His hands are tied.

Aviation is distributed among several bureaus pulling in different directions, and nothing of real importance is being accomplished. An organization was submitted to the Secretary of the Navy in 1913, but he did nothing to establish it. To-day he advocates a bureau—seven years later!

The difference between army and naval aviation does not seem realized in Washington. But the material, the machines, the functions and the tactics cannot be the same in many respects in the army and navy. Army machines fly between points of land, start from the land and alight on the land, which is always stationary. Navy machines, on the other hand, must at times start from the sea or from ships that are moving, pitching and rolling, and they must sometimes land on a moving ship or in a rough sea.

Intelligence and organization at the Navy Department are imperatively demanded.

1. Establish a bureau of aeronautics.
2. Develop aeroplanes, bombing planes and torpedo-planes for naval uses.
3. Develop means for starting and receiving aeroplanes on the deck of a ship at sea or in the water alongside.
4. Build aeroplane carriers with a speed of thirty-five knots for service with the fleet.
5. Drill and develop the personnel of the naval air force to navigate and serve with the fleet.

There are individuals who know nothing of ships, seamanship or navigation who claim that a landsman aviator, with no naval training, can wrestle with naval conditions. It is preposterous!

A well-organized and efficient air force is vitally necessary in a modern fighting navy. It is fully as important as a submarine force. Without these two forces a surface fleet of dreadnoughts is powerless, offensively and defensively.

There is not one up-to-date long-range submarine in the United States Navy to-day. The United States naval air force is grossly inadequate. The condition is precarious.—*Editorial in N. Y. Tribune.—The Aerial Age Weekly*, Jan. 17, 1921.

ENGINEERING

MOTORSHIPS.—European shipbuilding nations, the Scandinavians at first, but now practically all, including England, France, Holland and Italy, in addition to Germany, have for some years been building large Diesel engines and auxiliary equipment for the driving of seagoing vessels. In more recent years this movement has been accelerated by the proved economy of the equipment that has been found most reliable and the reduction in cargo-carrying costs by the motorship over the steamship. The raising of all prices and costs by the war has directed attention to every possible source of saving, and this among other things has further increased the volume of motorship building at the expense of steamship construction.

During this whole period of experimental development of the propelling machinery, and with its perfection the large-scale demonstration of lower cargo carrying costs over competing steam equipment, America has done nothing with the motorship. On the contrary, there has been a great increase in steam cargo carriers, first as a result of war demands and later as a national movement for the reëstablishment of the American Merchant Marine in a position of some commanding importance at sea.

While America has been building more and more steamships, the Europeans have been building fewer in proportion, replacing them by motorships, partly on the basis of demonstrated reliability but mainly on the

basis of proved reduction of operating costs. Only now have our shipping interests passed the period of consideration and entered upon that of action.

It has taken some years to convince American shipping interests that the motorship is reliable; it has taken some years to convince these same interests that America can build satisfactory engines and that they need not be reproductions of European models; but it can be said definitely that shipping interests have now reached the point of accepting this situation. It is admitted that American Diesel engines can be built equal in quality to those built in Europe and also at competing costs, but in spite of this there has not as yet been any great adoption of the motorship in this country. Only a few have been contracted for to-day, although a great many projects are under consideration.

Apparently American shipping interests have not yet been convinced of the superior operating economy and lower cargo-carrying costs of the motorship as compared with the steamship, especially when the latter is provided with the geared turbine Scotch-boiler type of equipment. At the present time the future of the motorship in American shipping activities seems to be hanging in the balance of these comparative costs of operation.

The motorship equipment costs materially more to buy than does the steamship equipment. Its fuel consumption is materially less the ratio at sea being 1 to 2½ and still more favorable while in port. While there are corresponding differences in all of the other items of expense, such as wages and subsistence of crew, maintenance, repairs, stores, to mention a few of the leading items, it appears that the main elements of controversy and uncertainty lie in the balancing of the money saving by the motorship, due to fuel economy, against the excess of fixed charges which it must carry.

Whether or not the cheaper steamship, burning 2½ times as much fuel as the motorship at sea, will give a lower or higher total cost of handling cargo per ton-mile, depends not only on the difference in the first costs, but also upon the prices of fuel per gallon, on the number of sea-miles per year of operation or horsepower-hours per year, or the ratio of time spent at sea to that in port; and in the case of the fuel on whether or not the motorship burns the same grade of fuel at the same price as does the steamship. For any given first-cost differential, constituting a fixed-charge handicap against the motorship, the money saving by the superior fuel economy of the motorship will be more than enough to offset it and show a net profit, provided the ship is kept at sea in actual cargo carrying a sufficiently large proportion of the total time. It will also depend on the fuel-price differential, as well as on the fuel price itself.

Analyses of these cost factors and totals indicate that the motorship is best adapted to long-distance voyages, the longer the better, and in this connection it should be noted that in the double-bottom bunkers of the motorship sufficient fuel can be carried for a total of 20,000 miles, which is much more than in the case of a steamship. The minimum length of voyage that can be profitably assigned to the motorship in competition with the steamship would seem to depend on the fuel-price differential, assuming the two ships do not burn the same grade of fuel.

As to fuel price, it seems pretty clear from what statistics are available that the general trend of price is upward, and that in view of the growth of the automotive industry this will continue so. This being the case, so far as forecasts are at all justified, it would seem fair to predict that, if anything, conditions in the future will favor the motorship more than in the past, because with a given saving in fuel per ton-mile by the motorship over the steamship, the money saved will be greater the higher the price of fuel.

The matter of price differential, however, is a disturbing factor. The Diesel engine has in the past consistently used a higher grade of fuel oil than has been burned under the boilers of the steamship and at prices ranging from 25 cents to 50 cents a barrel more than the steamer bunker oil

Due to the increase in the demand for light petroleum products for motor cars and similar uses, there is almost sure to be a greater differential in price between the lighter fuel that the motorship has been using and the low-grade steamer bunker oil than has been the case in the past. This would be serious, and the saving in the motorship would be wiped out if the differential were great enough, provided it were true, as some think, that the Diesel engine could not burn the lower grade of oil.

As a matter of fact there is no reason to believe that the Diesel engine cannot burn this low grade of oil except that so far it has not done so. It has not done so mainly because it is necessarily more troublesome, and so far it has not been necessary to take that trouble. It is quite clear, however, that when the price differential becomes great enough, it will be worth while to go to some trouble and expense to adapt the Diesel engine to this lower grade of fuel oil, or *vice versa*, and so wipe out the price differential entirely, which will restore to the motorship all of the advantages to which it is entitled.

To adapt the motorship to the burning of the lower-grade oil, which seems to be really the only step necessary to eliminate even the residual doubts remaining in the minds of American shipping interests, there are only two factors of any importance to be studied, namely, spraying of the oil and ignition temperatures.

It appears from all of the research work that has been done on spraying, particularly in connection with the spraying of oil in boiler furnaces with the so-called mechanical atomizers, that all oils can be sprayed equally well regardless of their other physical properties if they are brought by heating to the same viscosity. It would seem as if this should also be true when the oil is sprayed into a cylinder against a pressure of from 400 to 500 pounds per square inch, and some experimental work already done confirms this as a reasonable conclusion, though it is not yet a commercially established fact.

If the heavier residual fuel oils have, as may be the case, a higher ignition temperature than the lighter ones, there may be some difficulties about ignition at the compression which has been used for the lighter fuels. In this case two remedies are available: One to raise the compression, which has the objection of overloading the bearings, framing or the running gear and consequently increasing weights to avoid this; and the other to use an igniting fuel in small amounts, not exceeding 10 per cent of the total injected before the main supply of fuel, as has been done in Europe in burning tar oil. As soon as it appears to be necessary American engineers will undertake the building of the auxiliary apparatus and make the modifications necessary to adapt any grade of oil to the oil engine that can be fed through pumps from storage tanks, and thus wipe out any price differential that may exist, or may develop in the future, with every prospect of success. In general, whatever appliances are successful with one type of engine will be successful with all, because engine differences are not such as will prevent the general adoption of a broad scheme of fuel-oil conditioning developed for this purpose.

It may be said, therefore, that America is about to enter on its program of motorship development and use, and in fact has actually entered it within the last year. The rate of adoption depends upon the speed with which established facts become recognized and known, and are followed by building orders. It is of considerable interest to note that the motor-car industry, in which America now leads the world, developed in Europe in quite the same way as the motorship industry, and it is not too much to expect that once American interests become convinced that the motorship is what the Europeans think it is, American motorship construction and operation will also lead the world.—(Charles Edward Lucke.)—*Mechanical Engineering*, February, 1921.

WATER INJECTION IN GASOLINE ENGINES.—The practice of injecting water in conjunction with the fuel is quite common in kerosene engines, the object being to keep down the cylinder temperature under conditions of heavy loading and prevent pre-ignition. In fact, it seems very difficult to operate an Otto cycle kerosene engine and get satisfactory results without water injection. There also has been considerable experimentation with water injection (or induction) in gasoline engines, by makers of fuel conditioners and their customers, who believe that the injection of water will lessen or eliminate the formation of carbon deposit and increase the fuel economy.

In the development of aircraft engines, the suggestion was made that if water injection had these effects it should be beneficial in aircraft work. The problem was assigned by the National Advisory Committee for Aeronautics to the Bureau of Standards, and an extended investigation was made. The tests were carried out on a Class B military truck engine, and also on a Rutenber 6-cylinder, 3 x 5 inch engine, which operated at high jacket temperature. Although the investigation was made at the instigation of the Aircraft Department, the tests were conducted on a truck and an automobile engine, but the results, of course, are of general application.

The results arrived at have been summarized by the experts of the Bureau of Standards somewhat as follows: No appreciable effect is produced upon the power, fuel economy and general operation of a gasoline engine by the injection of water into the cylinders at rates varying from 0.03 to 0.44 pound per brake horsepower-hour. When water is injected at a higher rate than 0.44 pound per brake horsepower-hour there is an appreciable decrease in the power output, fuel economy and smoothness of operation. It is quite probable that in a badly carbonized engine, or an engine of defective design, in which there are hot spots that cause pre-ignition, the injection of the water results in an increase of power. In an engine operating at high waterjacket temperature the injection of water in amounts between two and eight pounds per hour produce a softening and slight reduction of carbon, this reduction not exceeding 25 per cent and being most noticeable in the piston heads and valves. However, water injection at the maximum rate also causes a considerable reduction of power.—*The Scientific American*, Feb. 5, 1921.

COLLOIDAL FUEL.—This subject was dealt with exhaustively in two papers by Mr. Lindon W. Bates, who devoted his attention chiefly to a general description of this material, and by Mr. Haylett O'Neill, who supplied more detailed information as to its properties and characteristics.

Mr. Bates outlined the origin and future possibilities of the colloidalizing process. Regarded from the economic standpoint the author says that the fuel possesses several advantages over fuel oil or coal alone. Briefly these are: Less liability to take fire; if on fire the flames may be quenched in and by water and, in storage, fire may be prevented by a water seal; greater calorific value than either of its components separately; it has greater combustion efficiency than straight oil, and, lastly, may be used in the usual oil-burning installations without material modification.

Mr. O'Neill described in detail the composition, uses, cost, etc., of the fuel. For commercial purposes the fuel contains 25 to 40 per cent pulverized coal, held in stable suspension in oil so that the product can be handled and fired with the usual oil-burning apparatus. The solid component may be coal, coke, charcoal, hard pitch, or any carboniferous substance capable of being ground. The fluid component will vary according to its availability in various countries. In England imported heavy petroleum oils are usable, with possibly the addition in certain cases of a thinning oil. Tar, and tar products in combination with oil, may be used where oils are more expensive.

Storage of the fuel may be in ordinary oil tanks, and its measurement accurately made by sounding pipes or depth gauges. The comparative specific gravities of coal, oil, and colloidal fuel, also its calorific value, are discussed, and by means of tables and charts the author shows that there are considerable advantages in favor of colloidal fuel, among which may be noted its stability in storage, low rate of evaporation, and immunity from the action of sea-water—a valuable point when stored in leaky ships' bunkers. In dealing with the transport of the fuel the author mentions that its characteristics as regards flow through pipe lines do not differ materially from crude oils; it is stated in general that the colloidal fuel is more viscous than its fluid component. Carbonizing at the burner tip is not greater with this than with crude oils, and in comparison with the greater number of heat units fired the possibliity of slightly increased wear is negligible. Handling the fuel in the furnace is described, and, in connection with its combustion efficiency, it is stated that tests on sea and land prove that for steam-raising purposes it is at least the equal of oil. Mr. O'Neill enlarges upon the safety of the oil, and suggests its possible use as a protective wall around the power plant of a warship. Lastly, on the all-important question of economy, it is shown that by the use of colloidal fuel there is a gain of a few per cent on account of storage efficiency over straight oil, owing to its higher heat capacity per unit of volume and freedom from evaporation, but the big factor of economy is the saving in cost per given number of heat units over those of straight oil, on account of the coal component being so much cheaper than the oil.

The paper is accompanied by a number of charts and tables comparative of the properties of colloidal fuel and other fuels in liquid and solid form. (Lindon W. Bates, F. R. G. S., and Haylett O'Neill, papers read before the Institution of Petroleum Technologists, Nov. 16, 1920.)—*The Technical Review*, Jan. 4, 1921.

TWO GIGANTIC WATERPOWER DEVELOPMENTS.—The present high cost of fuel is not an unmitigated evil; for under the spur of necessity we are being driven to make use of other natural sources of heat and power than coal and oil, on a scale that otherwise might not have been attempted for decades to come. We have particularly in mind two power developments, one in England, and the other in the United States, each of which will be far greater in output than any waterpower plant at present in existence or contemplated. Of these, the British scheme is the more original, since it contemplates the use of the tidal power of the estuary of the Severn River. That the scheme is not visionary is proved by the fact that the investigations and plans have been drawn up under the British Ministry of Transport. Briefly stated, a dam 2½ miles long will be thrown across the mouth of the Severn and in this dam will be installed hydroelectric turbines of a total of one million horsepower. The total fall of tide is thirty feet, and to secure a continual supply of current, 500,000 horsepower will be delivered direct to the line and the other 500,000 horsepower will be utilized in pumping water to a high level reservoir, which will supply hydroelectric turbines during the five hours in which the stage of the tide will prevent operation of the turbine plant in the main dam.

The American scheme contemplates the building of a dam 500 feet in height, which will impound 93 per cent of the flow of the Colorado River in a storage basin over 200 miles in length, impounding more than forty million acre-feet of water. The total hydroelectric development as thus provided for will be over four million horsepower. It is contemplated to distribute this power over country covered by a radius of 500 miles, and embracing eight of the western states. The gross hydraulic head of 3300 feet will be developed at four separate power stations, located along the course of the river. The scheme has been under investigation for several

years, and the application recently presented to the Federal Power Commission has been accepted.—*The Scientific American*, Jan. 25, 1921.

THE SCINTILLA MAGNETO.—In this magneto the magnet is mounted on the rotating spindle and rotates between laminated pole pieces attached to a stationary armature.

A compact arrangement of the windings has been obtained, built up on a laminated core. The contact breaker is stationary, the breaker cam only rotates, this being fixed to the same spindle as the magnet. There are no internal cable connections, all contacts being made by laminated copper plates. It is claimed that this magneto is absolutely waterproof. (*Motor Traction*, Nov. 1, 1920.)—*The Technical Review*, Jan. 18, 1921.

RADIO

AEROPLANE RADIO DIRECTION FINDING.—In view of the coming extensive use of radio direction finding in the air service in connection with cross-country flying, results of experiments conducted by engineering division, McCook Field, as to the accuracy that may be expected will be of interest to all branches of the air service.

Experiments were conducted by the engineering division during the past summer using radio as a means of assisting aeroplanes to return to the home aerodrome. Results of these experiments have shown that it is possible to guide an aeroplane with absolute accuracy to any radio transmitting station, and further that an experienced operator is not needed for this work.

The method used was that of two closed loops mounted on the wings of an aeroplane at right angles to each other, and operating upon a maximum signal. The particular installation used was mounted on a Curtiss *NJ-4-H* aeroplane, and consisted of two main or "fore and aft" loops of four turns each, connected in series, one loop being mounted on the outside struts of each wing. The auxiliary loop consisted of four turns of wire and was mounted at right angles to the main loops, struts numbers 4 and 10 being used. The fuselage of the aeroplane was enclosed by this loop. The wire was sewed into fabric and the strips of fabric were doped on to the struts and wings of the aeroplane. Leads were brought from the loops into the rear cockpit of the aeroplane and there connections were made to suitable switches, condensers, amplifiers, etc.

When flying at a height of 2000 feet it was possible to guide the aeroplane exactly over the transmitting station. This was done while allowing the man operating the switches in the rear cockpit to control the rudder, and thus steer the aeroplane as he desired. This experiment was tried both with experienced radio men in the rear cockpit and with men who knew absolutely nothing of radio and who did not know the Morse code. Results were the same in all cases—the aeroplane was brought directly to the transmitting station, no note being taken of the course steered from other than a radio standpoint. When flying at 2000 feet it is possible for the operator to easily detect when the aeroplane passed as small a distance as 100 feet from directly over the transmitting station.

These experiments do not embody any new departure in radio direction finding in aeroplanes. The method used was a part of the method brought out in England during the war, and which was to be used for navigating the Handley Page night bombers of our air service. These experiments are cited merely to show the degree of accuracy which may be obtained when using this method of radio direction finding for guiding aircraft.—*The Aerial Age Weekly*, Jan. 24, 1921.

RESONANCE COILS FOR RADIO.—Discovery of a new method of sending and receiving radio messages was announced recently by Major General Geo. O. Squier, according to *The Wireless Age*. Through development,

it is probable that wireless will be improved so as to permit the confining of messages to the parties directly interested. The discovery came about through investigations made early in the war on the uses of submerged bare wires. Out of it grew what is now known as a "resonance wave coil." Discussing some of the powers of the new invention, the scientists list the following: It is possible to locate an airplane in flight, to tell the direction of the flight, to tell how high it is flying and to tell by the use of two coils and mathematical deductions the distance of the airplane from the wave coils. The instruments can be used as range finders and in the same manner they can be used for airplane finding. Radio messages can be handled from airplanes without the trailing wires now used. Static interference can be reduced.—*The Scientific American*, Jan. 29, 1921.

THE USE OF COILS INSTEAD OF ANTENNÆ FOR WIRELESS RECEPTION.—This change has been made practicable by the development of cathode tube amplifiers. Important earlier research work in this direction by Professor Braun led to no practical result, as the necessary amplifiers were not then available.

The main advantages of receiving apparatus without antennæ are as follows:—1. The coil can be placed close to the ground. 2. The whole apparatus is very small and inconspicuous, and can be placed in any room. This advantage is of great military importance. 3. The apparatus is simple, light, and portable. 4. The directional effect enables strays to be easily eliminated. 5. Atmospheric interferences much lessened. 6. The direction of the sending apparatus can be accurately determined. 7. No more apparatus is needed with the coil than with antennæ.

The properties of receiving coils—or frames, as they are sometimes called—their dimensions and most suitable arrangement, are theoretically considered and experimentally confirmed. Five different methods of connection are described and illustrated. A special section is devoted to direction finding. (Dr. Ing. H. Hoffmann, *Jahrbuch Zeitschrift für drahtlose Telegraphie und Telephonie*, July, 1920.—*The Technical Review*, Jan. 25, 1921.

MISCELLANEOUS

CHEMICAL DISARMAMENT.—Germany is still *Ueber Alles* in dye-production. Everybody who is interested in dyestuffs is concerned about this. The Allied nations are legislating about it, yet few realize that the balance and control of the dye industry is an essential factor in world disarmament. Dye-factories are chemical plants, and to turn their production from dyes to explosives and poison-gas is the work of a very brief period. V. Lefebure, formerly British liason officer with the French forces, makes the assertion, in an article contributed to *Chemical and Metallurgical Engineering* (New York), that "chemical disarmament is the crux of all disarmament." All the more is this so because we can not disarm chemically by destruction. Guns may be broken up and forts dismantled, but we cannot destroy chemical industry, because it is essential to the arts of peace. In this case, Mr. Lefebure asserts, we must disarm by preventing monopoly. Distribute the chemical industries uniformly over the world, instead of concentrating them in Germany, and a menace to world peace will be removed. He believes that the Versailles Treaty contains the machinery for doing this very thing. He says:

"The League of Nations has instituted a definite commission to consider the question of world disarmament. A brief analysis reveals the fact that disarmament must cover three essential factors in warfare—the combatants, mechanical types of armament, and war-chemicals.

"Chemical armament, very generally, represents the actual death-dealing constituents of projectiles. This must, however, be qualified by the statement that the new type of chemical armament has become in some cases, and may increasingly become, independent of any special projectile. This

is a most important item from the point of view of disarmament. It means that the limitation of projectiles may not carry with it limitation of the chemical weapon.

"How do normal disarmament schemes apply to the chemical type? This type of weapon covers, roughly, two classes—explosives and the so-called poison-gases. They have one common characteristic. This is their peace-time use. This refuses to any disarmament scheme the right to disarm in the simplest fashion—that is, by the total destruction of producing capacity. The world must have for normal development a large producing capacity for explosives and for the other types of chemical armament. Germany produced practically every ounce of her hundreds of thousands of tons of poison-gas in dye plants. The infinitely flexible, almost instantaneously converted dye plants are a logical means of production of all organic chemical weapons, including explosives.

"We must now stop to lay emphasis on a general principle. There are two methods of disarmament. In the first class you can disarm very simply by destroying all the means of production and preventing their renewed growth. In the second class, because the means of production—the factories—have a peace-time function, you cannot disarm by destruction. How then, can you disarm in this case?

"There is only one way—it is to insure that no one country possesses a monopoly in the means of production. The brightest and most telling war-chemical invention has no value for and no incidence upon warfare unless it can be produced rapidly and in quantity. Production is the key to its war-use. Let us examine very briefly, therefore, the world distribution of the means of production for this new type of weapon. Before the war Germany held the almost absolute monopoly of world organic chemical production. Through this monopoly she launched the poison-gas campaign, and for more than two years the Allied reply was relatively feeble. This was not due to Allied lack of invention, but to lack of producing capacity.

"During the war, however, for economic rather than military reasons, dye-producing industries sprang up in France, America, and England. Their development was relatively feeble, owing to numerous obvious reasons. From the point of view of our argument this development left the world in the following situation regarding organic chemical-producing capacity:

"The German dye industry, the source of her war-chemical production, was considerably strengthened. Other countries were left with promising but relatively feeble organic chemical resources which could not immediately, even under normal commercial conditions, hope to break the German monopoly. In other words, although for most types of armament the pre-war balance in favor of Germany was decreased, yet for this one type of chemical armament the German monopoly was strengthened."

We are, therefore, declares Mr. Lefebure, left in face of the following situation: For most types of armament the war has led to a redistribution of producing capacity in the direction of an equilibrium. By diminishing this capacity and controlling and inspecting we may obtain international disarmament; but in chemical warfare, the final situation is just as remote from equilibrium as before. The conclusion is obvious. The world must have organic chemical-producing capacity, but it cannot tolerate a monopoly held by those who so drastically abused its possession. There must be a redistribution before we can claim to have even approached disarmament. It would be farcical to proceed with general disarmament schemes and to leave this untouched. In other words, we must break the German monopoly. He continues:

"How can this be achieved? There are two main avenues of approach. The new-born dye industries of France, America, and England, and if you wish, other countries, must be supported nationally through legislation and internationally through some such organization as the League of Nations.

"In America and England legislation designed to protect the dye industry is before both countries. The issue is likely to be fought out on purely national grounds. This alone is entirely unsatisfactory. It must be realized by all concerned that they are legislating on a matter which has infinitely more than commercial significance. They are legislating on world peace.

"Chemical disarmament is a matter which, unfortunately, non-technical people do not fully understand. They think it sufficient to issue an edict against the use of poison-gas, not realizing that this alone is absolutely futile as an effective measure. You cannot prevent any discoveries in chemical warfare, because, unlike the development of mechanical invention, such chemical discoveries can occur, when directed by a trained mind, with the mere use of a few pots, pans, beakers, in any unguarded and unsuspected locality. The redistribution of producing capacity is therefore critical.

"Article 168 of the Treaty of Versailles provides for the restriction by the Allied and Associated Powers of the manufacture of war-material and the approval of those powers for the continued existence of factories and works for such production in Germany. On these grounds it is logically possible to limit seriously that capacity of the German dye industry which produce poison-gases during the war and may continue to do so. Article 169 provides for the surrender to the Allied and Associated Powers of any special plant intended for the manufacture of military material, except such as may be recognized as necessary for equipping the authorized strength of the German Army. The execution of this clause, if a proper interpretation of chemical armament be used, would imply the closing down of many of the German dye plants which produced those huge quantities of poison-gases during the war.

"We repeat that the crux of all disarmament is the redistribution of organic chemical capacity throughout the world. This is, without any doubt, one of the most important measures now before the world, and, in addition, one of the few measures with regard to which immediate action can be taken toward the stabilization of world peace."—*The Literary Digest*, Feb. 12, 1921.

THE LEAGUE AND DISARMAMENT.—To quote a well-worn phrase, disarmament is the acid test of the League of Nations. But if that body is powerless to settle a minor issue such as the disposal of the German cables, which is causing so much friction as between the United States, France, and Japan, how can it suggest anything practical in a matter involving the life of nations? Consequently there was a sad consciousness of an adverse world in the speeches at Geneva in discussing the report of the committee in connection with the fulfilment of Article 8 of the Covenant. This provides for a reduction of armaments. But up to the present almost nothing has been effected. In theory the Assembly is still hopeful, but admits the tremendous difficulties which will have to be surmounted before anything practical is accomplished. Not only do naval and military powers stand outside the League, but the economic and financial situation is such that it would be almost impossible to adjust national budgets to any fixed standard. Most of the speakers admitted that the ideals of the League and the realities of the world are not capable of adjustment by the action which has been taken. All it amounts to is a recommendation to the Council to submit for the consideration of members of the League a preliminary scheme for a kind of two years' military holiday in naval and military expenditure. What kind of reception will this proposal of the League, modest as it is, meet in Paris, Washington and Tokyo, not to speak of London? Not a very friendly one. In these circumstances the British representatives, Mr. Fisher and Mr. Barnes, merely beat the air when they indulge in optimism. The first said that the "limitation of armaments is an object which can be achieved with comparative ease." Only on paper.

Otherwise the burden would have been lifted long ago. This kind of reasoning is not helpful, and when we carefully refuse to make recommendations or to bind ourselves in any way, other nations are inclined to doubt our sincerity. Mr. Barnes, on the other hand, thinks that the committee which deals with the question has shown "too much prudence and too little pluck." But he omits to enlighten us any further. If only the League would be content to go slowly!—*The Army and Navy Gazette*, Dec. 25, 1920.

SAILING VESSELS.—The author refers to the comparative cost of ocean cargo transport by steamers and sailing vessels, and points out the economic limit beyond which the former do not constitute a profitable means of transport.

A diagram shows the cost of engine power, based on cost and consumption of coal per horsepower, covering the period between 1800 and 1920, and the limit for steam-driven cargo vessels. Coal has proved too expensive during three periods, the first from 1800 to 1843, when sailing vessels were exclusively used; the second from 1853 to 1881, when sailing vessels again came into their own; while the third period commenced in 1912 and still continues, as goods can be carried far more profitably in sailing vessels. It is pointed out that the present type of clipper-built six-masted schooner is very much more economical than the old-fashioned full-rigged ship, because it is much easier to handle, attains a higher speed, and sails much closer to the wind. In fact, it only fails during periods of calm weather, which are not very frequent.

The author proposes to build six-masted schooner clippers of 5000 tons capacity, fitted with oil motors to be used only during calm weather. Such ships would have a sail area of 36,600 square feet. The masts would be of uniform height and provided with gaff sails of equal size to be operated with electric winches in order to require a minimum of attendance. Vessels of this type are increasing in number in Scandinavia and Germany, and have been able to make long voyages at an average speed of seven knots. Their owners report a return of 70 per cent on the capital expended, or nearly twice the amount from the best class of steamers using superheated steam in up-to-date engines. (C. O. Liljegren, *Industritidningen Norden*, Sept. 24, 1920.)—*The Technical Review*, Dec. 28, 1920.

RHINE-MAIN-DANUBE SHIP CANAL.—The linking up of the North Sea with the Mediterranean by a trans-continental waterway was discussed in the court of Charlemagne in 793, and a commencement made, although subsequently abandoned.

A canal connecting the Main with the Danube was actually constructed in 1836 by the Bavarian Government, but only for barges of 126 tons capacity. It has more than 100 locks, and is much too diminutive for modern transport requirements. The Bavarian Parliament voted five million marks in 1917 towards the cost of a new Main-Danube Canal, which is to connect northern Bavaria with the Danube, and to be suitable throughout for ships 233 feet long by 33 feet wide, with 7 feet 3 inches draft, viz., 1200 tons burden. It is, in addition, to accommodate vessels of 1500 tons burden, viz., 279 feet long by 33 feet 6 inches beam, from the Danube to Aschaffenburg.

The total length of the proposed canal necessary to join the three rivers, including the length of the canalized river Main and Regnitz, is 451 English miles. The total rise to be negotiated above sea level is 1340 feet, requiring 60 locks. It is hoped to transport 12 million tons annually, the average time of transit to be 145 hours.

Hydro-electric power to the extent of 168,500 horsepower, yielding 936 million kw. annually, will also be available.

The estimated cost of the canal is 597 million marks (nominally £30,000,000). The annual expenses are detailed, and the national gain by way of decreased cost of transport is valued at £1,800,000 annually. (*Das Technische Blatt*, June 26, 1920.)—*The Technical Review*, Jan. 25, 1921.

CURRENT NAVAL AND PROFESSIONAL PAPERS

Germany's Air Aims. *The Literary Digest*, Jan. 22, 1921.
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The Development of the Aero Engine. *Engineering*, Jan. 21, 1921.

NOTES ON INTERNATIONAL AFFAIRS

FROM JANUARY 10 TO FEBRUARY 10

PREPARED BY

PROFESSOR ALLAN WESTCOTT, U. S. Naval Academy

GERMAN REPARATION TERMS

ALLIES FIX AMOUNT OF REPARATIONS.—The amount and the method of payment of the reparation to be demanded of Germany were agreed upon at a conference of Allied Premiers and financial experts held in Paris during the last week of January. The total reparations payment was fixed at 226 billion gold marks (about 55 billion dollars) payable in 42 annual instalments. The plan was outlined as follows:

First—In forty-two years Germany shall pay to the Allies the sum of 226,000,0000,000 marks in gold, or its equivalent, on this scale—2,000,000,000 marks annually in 1921 and 1922, 3,000,000,000 marks annually in 1923, 1924 and 1925, 4,000,000,000 marks annually in 1926, 1927 and 1928, 5,000,000,000 marks annually in 1929, 1930 and 1931, and 6,000,000,000 annually from 1932 to 1962.

Second—Germany shall pay to the Allies for forty-two years an annual tax of 12 per cent upon the total of her exports.

Third—Germany shall revise her interior fiscal system, balancing her budget and curtailing the issue of paper money, increase her taxes generally, raise the imposts upon alcohol and tobacco, and increase railroad fares and postal rates.

Fourth—In case Germany does not fulfill these conditions the Allies have the right to seize the German customs, impose direct taxes in the Rhineland and otherwise exercise financial control upon Germany. In addition military penalties will be provided.

By this plan the period of 31 years for payments fixed by the Versailles Treaty was increased to 42, a change requiring German consent. The amount of 269 billion marks fixed by the earlier Boulogne Conference was somewhat reduced, but this was compensated for by the proposed 12½ per cent tax on German exports. The returns from this tax are difficult to estimate; it was recognized that the tax would be actually paid by foreign purchasers, and that it would serve like a protective tariff to keep up high prices.

CRITICISM OF REPARATION TERMS.—Mr. J. B. Keynes, author of *The Economic Consequences of the Peace*, declared on January 30 in the Manchester *Guardian* that the amount required of Germany was "double the highest figure that (to my knowledge) any competent person here or in the United States has ever attempted to justify." Washington authorities were reported as adhering to the view that Germany could not pay more

than 10 billion dollars plus interest. An American expert pointed out that there were only two policies possible: (1) a reasonable indemnity, with restrictions on Germany's access to foreign markets, (2) a larger sum, with full opportunity to Germany to engage in foreign trade while Allied countries decreased production. The second method appeared far less desirable.

On the other hand, the French Finance Minister, Louis Loucheur, on January 18 declared that German complaints were largely "bluff," and that she could pay 10 billion francs annually, four-fifths of it in coal, without crippling German industry. He pointed out further that the German Government was feeble, and that taxation and railroad rates were lower than in Allied countries.

GERMANS AGREE TO DISCUSS TERMS.—After two stormy meetings, the German Cabinet on January 31 decided to send delegates to the proposed meeting in London, in the effort to persuade the Allies that the terms demanded were impossible. On February 8 a note was dispatched to Premier Briand of France accepting the invitation to the London Conference on March 1 "on the supposition that negotiations would take place also on propositions the German Government intends to present to the conference."

BRIAND GETS VOTE OF CONFERENCE.—After four days of heated debate the French Chamber of Deputies accepted the Paris Reparations Terms by a vote of 395 to 83, and gave its support to the Briand Ministry by a vote of 387 to 125. Premier Briand eluded all efforts to pin him down to a definite promise not to recede from the Paris terms. He declared that agreement among the Allies came first, and that France could not act alone. It was evident, however, that any weakening in London on the indemnity terms would mean the downfall of the Briand Ministry.

CONFERENCE SET FOR MARCH 1.—The London Conference is to be held on March 1. Lloyd George, Briand, Count Sforza and Jaspar will represent Great Britain, France, Italy and Belgium. Japan will be represented by one of her ambassadors, and Greece is to send a representative, and in this connection it should be noted that Gounaris, who has been notoriously pro-German, would not be acceptable to the Allies as the Greek delegate.

Besides Germany, Turkey is to send a representative. Information has reached London that in addition to the Sultan's delegation from Turkey, which is proceeding overland, Mustapha Kemal is coming to London by sea, via Brindisi. With two rival Turkish delegations present, a curious situation may result.—*N. Y. Times*, Feb. 9, 1921.

OCCUPATION COSTS REDUCED.—Count Sforza, Italian Foreign Minister, in announcing the results of the Paris Conference, revealed the decision that the expense to Germany for Allied occupation forces was to be reduced to about $60,000,000, or one-sixth of the present cost. It is estimated that this saving of $300,000,000 annually for a possible period of 15 years would nearly offset the proposed 12½ per cent tax on German exports.

REVISION OF TURKISH TREATY.—It was announced from Constantinople on February 6 that Mustapha Kemal would either come himself or send delegates to the London Conference on March 1, in which the Turkish problem will be taken up. The Constantinople government will also be represented. Greece decided to send her new Premier, M. Kalogeropoulos, who succeeded M. Gounaris at the beginning of February. The decision to revise the Treaty of Sevres meant a victory for French policy, which has favored coming to terms with the Turkish Nationalists rather than allowing Greece to retain her present concessions in Asia Minor.

PROPOSED CANCELLATION OF ALLIED LOANS.—Much interest was aroused in the United States by the statement of J. Austen Chamberlain, Chancellor of the British Exchequer, that Great Britain had approached the United States with proposals for a general cancellation of debts owed among the Allied and Associated Powers. As shown by the following statement, Great Britain would lose by such an arrangement, though less heavily than the United States. Secretary of the Treasury Houston later stated that one nation had made such a proposal, but that it had not been favorably received by the American Government.

UNITED STATES

Owed to by Allies	$9,580,000,000
Owed by to Allies	.....
Balance lost	$9,580,000,000

GREAT BRITAIN

Owed to by Allies	$8,335,050,000
Owed by to Allies	4,620,550,000
Balance lost	$3,714,500,000

FRANCE

Owed to by Allies	$1,645,185,000
Owed by to Allies	7,508,635,000
Balance gained	$5,863,450,000

MANDATE TERMS PUBLISHED.—The mandate terms for Mesopotamia and other areas thus disposed of by the Versailles Treaty were published in the London press at the close of January. It is understood that the publication of these terms, prior to their submission to the American Government, was not relished by the American State Department, and was taken as evidence that the powers which control the League of Nations had determined to take their own course in the government and exploitation of mandate territory without permitting the participation of the United States.

It was stated on February 9 that the British reply to Secretary Colby's note of November 20 on the nature of mandates and control of oil and other rights in mandate territory, would soon be delivered, and that the British and the American Governments would then publish all the correspondence on this question.

PALESTINE UNDER BRITISH MANDATE.—At the time of the publication of the Mesopotamian Mandate, the terms upon which Great Britain will take a mandate over Palestine were also made public. According to these terms Great Britain assumes control of the foreign relations of Palestine, protection of its inhabitants abroad, and imposition of taxes and customs, while the inhabitants are to be given "the widest measures of local self-government consistent with prevailing conditions." Evidently while Palestine is to be a home or refuge for Jewish people who may wish to seek shelter there, it is not to take on the character of a nation.

GREAT BRITAIN

EFFORTS FOR IRISH SETTLEMENT.—No satisfactory results followed the conferences in London during the first week in January between the British Ministry and Father O'Flanaghan, representing the Sinn Fein. Early in February, following conversations between Premier Lloyd George and Sir Edward Carson, rumors were circulated of a plan to persuade South Ireland to accept the Home Rule Bill by offering full fiscal autonomy to both sections of Ireland. It was reported that concessions of this character would go far toward reducing Irish opposition, and that the Sinn Fein leaders had agreed to negotiate on a "Dominion" form of government fulfilling the following requirements:

1. Acceptance of the partition of Ulster.
2. Full fiscal autonomy.
3. Full amnesty for all "rebels," regardless of the charges against them.
4. Withdrawal of British troops from Ireland.

MAYOR OF CORK IN AMERICA.—Mayor O'Callaghan of Cork, Ireland, arrived in Norfolk, Va., early in January, as a stowaway, having taken this means of coming to America to testify before the Villard "Committee of One Hundred" on Ireland. As he had entered the United States without a passport, the State Department ordered his immediate deportation. The Department of Labor, however, ruled that he should be considered as having the status of a seaman. Upon receipt of seaman's papers he was able to remain in this country until the completion of his activities and then take ship for Ireland.

AMBASSADOR GEDDES VISITS ENGLAND.—In the middle of January the British Ambassador to Washington, Sir Auckland Geddes, made a short visit to England. It was understood that his journey was for the purpose of informing the British Government and the Supreme Council regarding the attitude of the Harding administration on the League of Nations and other outstanding questions involving the United States and Great Britain, including the Irish question, mandate terms, disposal of former German cables, canal tolls, Japanese negotiations, treatment of British subjects in Mexico, tariff and trade, and reduction of armaments. The ambassador returned in February with definite information as to the policy of his government in these matters.

FRANCE

BRIAND HEADS NEW MINISTRY.—Following the resignation of the Leygues Ministry early in January, an unsuccessful attempt was made by Raoul Peret, President of the Chamber of Deputies, to form a new cabinet. The task then fell to the veteran Aristide Briand, who on January 16 announced the completion of a slate, with Louis Loucheur as Minister of Finance. M. Briand is rated as one of the best statesmen of France, and was premier from October, 1915, until March, 1917. His policy toward Germany is less uncompromising than that advocated by ex-President Poincaré. In outlining his policy to the French Chamber, he insisted upon disarmament and reparation on the part of Germany, to be enforced peacefully if possible, but by force if necessary; non-intervention in Russia, provided the Soviet army did not take the aggressive; reduction of military service without weakening the force available so long as Europe remained unpacified; general economy, and indulgence towards the working classes.

RUSSIA AND POLAND

POLAND SEEKS FRENCH AID.—Marshal Pilsudski, President of Poland, with the Polish Foreign Minister, Prince Sapieha, arrived in Paris on February 3 and left two days later after conferences with the French Ministry. The object of the Polish leaders was three-fold—to secure if possible military and financial assistance from France and a commercial treaty similar to that recently concluded between France and Czechoslovakia. As regards financial aid, France could promise little, and gave only a vague assurance that the matter would be considered after the settlement of the German reparation problem. The French Ministry also realized that French troops could not be forced to serve against Russia on Poland's eastern frontiers, though the Rhine forces would guarantee Poland against German aggression. It was thought that a commercial agreement would be negotiated by which France would extend credits to Poland in return for a preferred position in the Galician oil fields.

In the course of the conferences the following declaration was issued:

"On the occasion of the visit of President Pilsudski, the governments of France and Poland agreed upon the following declaration:

"'The governments of France and Poland, equally anxious to safeguard their security and the peace of Europe, have recognized once more the community of interests uniting these two friendly countries.'"

POLISH-RUMANIAN ALLIANCE.—The Polish Ministers in Paris did not fully admit the existence of a defensive alliance between Poland and Rumania, but declared that a Russian attack on Rumania would at once involve Poland. Before leaving Paris, Marshal Pilsudski gave assurance that the irregular Polish troops now occupying Vilna would be withdrawn upon the arrival of the international forces to be sent there by the League of Nations.

PRESIDENT WILSON ON RUSSIA.—On January 18 President Wilson despatched a note to the President of the League of Nations acknowledging

a note from the League dated December 26 which suggested that the Armenian question be laid before the American and Allied commissioners at Constantinople. This course President Wilson regarded as impracticable, but agreed that direct negotiations would be futile in view of Armenia's acceptance of Soviet protection. The President declared the Armenian problem could be considered only as an element in the disturbed condition all along Russia's frontiers, and in the following passage proposed that the powers should make an effort to define these frontiers and then agree to leave Russia alone so long as she kept within these bounds:

> The unrest and instability along the border are caused by bitter and mutual distrust. The struggling new nationalities, which were formerly part of the Russian Empire, are afraid to disarm and return to the works of peace because they distrust the Bolsheviki and fear new aggressions. The Soviets contend that they are afraid to demobilize because they fear new attacks.
>
> The great impediment to peaceful reconstruction in those troubled border territories, the imminent danger of new hostilities is caused by the utter confusion between offense and defense. Unless this distinction can be clearly defined there is not only small hope of peace, but no hope of a clear perception of who is responsible for new wars.
>
> It is, therefore, the thought of the President that the present moment offers a peculiarly pressing challenge to an attempt at general pacification on the Russian borders along these lines. Such an attempt seems to the President the logical outgrowth—in fact, the only logical development—of the request to mediate in the Armenian conflict, and he feels bound in conscience once more to call this matter to the attention of the associated nations.
>
> It is obvious to all that these small struggling states will not attack great Russia unless encouraged by promise of support from the stronger powers. The President therefore believes that the *sine qua non* of an attempt at pacification must be a public and solemn engagement among the great powers not to take advantage of Russia's stricken condition and not to violate the territorial integrity of Russia, nor to undertake themselves any further invasions of Russia, nor to tolerate such invasions by others.
>
> Such a public agreement would in effect say to those now in power in Russia:
>
> "You are not menaced from outside. The great powers have voluntarily guaranteed you from attack. You can have peace if you want it."
>
> The responsibility for any new war which might break out on the Russian border would then be clearly placed.
>
> If the principal powers represented on the Council of the League find themselves in accord with the President in this matter and will assure him of their moral and diplomatic support, he will instruct his personal representative, Mr. Morgenthau, to proceed at once on his mission.

NORMAN H. DAVIS.

BORDER STATES RECOGNIZED BY ALLIES.—On January 27 word was received in Washington that the Allied Supreme Council had decided to extend *de jure* recognition to Latvia and Esthonia, and had given intimation that similar recognition would later be accorded to Lithuania and Georgia. This action was regarded as a definite rejection of President Wilson's proposed policy that the dismemberment of Russia should not be given final sanction at this time The recognition of independent states on the western frontier of Russia would, it was thought, have a dangerous

reflex in Asia by affording Japan a pretext for promoting the severance of all political ties between Siberia and European Russia.

SOVIETS LOOK TO TRADE WITH AMERICA.—London, Feb. 1.—Leonid Krassin, who recently returned to Moscow from London where he acted as Russian Soviet Trade Commissioner, declared in an interview that it may be supposed, after the conclusion of a commercial treaty between Russia and Great Britain, that America will enter trade relations with Soviet Russia, although the American line of action will only be made clear after the final transfer of the Presidential power to President-elect Harding, says a Moscow wireless message to-day.

Krassin, the message adds, pointed out the importance of creating a great stock of goods for export, on which he said the whole matter of Russian trade exchanges with the western countries depended.—*N. Y. Times*, Feb. 2, 1921.

SOCIALISTS DIVIDED ON BOLSHEVISM.—According to a press account of January 25, the Socialist parties in various countries are seriously divided over the "twenty-one conditions" prescribed by Nicolai Lenine as determining whether these parties shall be received into the Third or Communist Internationale of Moscow. Lenine's chief demands were that the Socialist organizations should "purge themselves of all moderates, defy all national laws, undermine armies, gain control of the press, throw off the allied yoke, promote a world economic crisis, condemn any league of nations, aid the Soviet Government, and abandon all conservative Social Democratic programs."

Of the 15 nations where the Socialists have taken action, four have been against entering the Internationale, one undecided, four divided, and six in favor in spite of strong minority opposition. The American Socialists declared the right to decide upon their own internal policies. The German Independent Socialists at Halle last October voted 237 to 156 in favor of joining. The French Socialists in December split into three factions over the question. In Italy the conditions were rejected by a large vote, but the minority seceded to form an Italian Communist Party.

UNITED STATES AND JAPAN

NEGOTIATIONS WITH JAPAN CONTINUED.—It was announced on January 26 that the report of Ambassador Roland S. Morris, embracing recommendations for a settlement of outstanding issues between the United States and Japan, had been completed and submitted to the U. S. Department of State. The report was identical with that sent by Ambassador Shidehara to Japan, and covered the results of five months of conversations between the two ambassadors. Its proposals were as follows:

1. An amendment of the existing commercial treaty between Japan and the United States so as to grant to Japanese subjects lawfully in this country equal rights with the nationals of any other foreign nation.
2. A revision of the existing "gentleman's agreement" between Japan and the United States so as to make it conform to present-day requirements, and to that end absolutely prohibit Japanese emigration to America and Hawaii while admitting Japanese immigrants into the Philippines.

It was regarded as unlikely that any definite proposals would be submitted to the Senate by the Wilson administration. The Senate Committee on Foreign Affairs on February 9 requested that the State Department furnish an outline of the Ambassador's proposals.

SHOOTING OF LIEUT. LANGDON.—After the killing of Lieut. Warren J. Langdon, U. S. N., in front of the Japanese headquarters at Vladivostok by a Japanese sentry, the United States Government at once sent a note of protest. The Japanese reply promised a thorough investigation and inclosed a copy of an order to present similar offenses. The American Naval Court of Inquiry exonerated Lieut. Langdon from any blame in connection with the affair.

BORAH DISARMAMENT PROPOSAL.—On January 20 the U. S. Senate Committee on Foreign Relations reported favorably the Borah naval disarmament resolution. As reported, the resolution did not stipulate 50 per cent reduction in five years, as in the original form of the resolution.

The final form of the resolution was as follows:

As reported out by the committee the disarmament resolution reads:

"*Resolved*, by the Senate and House of Representatives of the United States of America in Congress assembled, That the President of the United States is requested, if not incompatible with the public interests, to advise the governments of Great Britain and Japan, respectively, that this government will take up directly with their governments and without waiting upon the action of any other nation the question of naval disarmament, with a view of promptly entering into a treaty by which naval building programs of each of said governments, to wit, that of Great Britain, Japan and the United States, shall be reduced annually during the next five years to such an extent and upon such terms as may be agreed upon.

"Section 2. That this proposition is suggested by the Congress of the United States to accomplish immediately a substantial reduction of the naval armaments of the world."

In spite of the Borah proposal, the Senate Naval Committee on February 9 endorsed the report of the Naval General Board for continuation of the Naval building program and condemned any suspension of construction as costly and unwise.

JAPANESE FOREIGN POLICY.—The address of Foreign Minister Uchida at the reopening of the Japanese Diet in the latter part of January was a detailed review of Japanese foreign policy.

Speaking of mandates for Pacific islands, Viscount Uchida said:

"When the terms and formulæ of mandates came up for determination a difference of views arose between the Japanese and British governments on the construction of the treaty stipulation relating to the terms and formulæ of the mandate over former German colonies lying south of the equator. Agreement could not be reached for a long time.

"A frank exchange of views, however, between the Japanese and the British representatives who attended the first session of the League Assembly happily resulted in composition of difference. While agreeing to the terms of the mandate of C Class, as proposed by Great Britain, the Japanese Government came to a full understanding with the British Government that Japan should make a declaration to the effect acquired rights of Japan

in former German colonies south of the equator should be fully respected and that their agreement to the terms of the mandate over these islands should not be taken to signify acquiescence on the part of Japan in any discriminatory and unfavorable treatment of her nationals in said islands.

"Accordingly, when the terms of Class C mandates were decided upon the 17th of December at a meeting of the eleventh session of the League Council, the Japanese representatives made a declaration on the lines of the above understanding and reserved for Japan the right to resume negotiations with the British Government concerning the treatment of Japanese subjects in the territories affected. The terms and formulæ of the mandates over former German possessions in the South Pacific having been determined, the Japanese Government is about to enter upon formal control and administration in pursuance of the terms of the mandate over the group of islands assigned.

"As to the revision and renewal of the Anglo-Japanese agreement of alliance, the Japanese Government has been giving careful consideration to the question with a view especially to its relation to the covenant of the League of Nations. They entered into conference with the British Government and a frank exchange of views on this matter took place both in London and Tokio.

"In view of Article VI of the existing agreement of alliance, it was decided to address the League of Nations a joint notification to the effect that the governments of Japan and Great Britain had come to the conclusion that the Anglo-Japanese agreement of July 13, though in harmony with the spirit of the covenant of the League of Nations, was not entirely consistent with the letter of that covenant and that they accordingly recognized in principle that, if said agreement was to be continued after July, 1921, it must be in form not inconsistent with the covenant. Notification was conveyed in a note dated July 8, 1920."

As to China, Viscount Uchida recommended the consortium plan, and continued:

"At a time when the powers interested are thus joining their hands to promote the welfare of the Chinese people by avoiding needless competition among themselves and by further strengthening their friendship and concert it is a matter to be openly deplored, especially by Japan, who as her neighbor is peculiarly interested, that complete and peaceful unification of China is not yet in sight.

"Last summer when the political situation of China began to give signs of further complication and later when things came to such a pass that the northern part of China became involved in armed conflicts the Japanese Government issued timely warning to their officials and nationals in China to refrain from any acts or activities that might be regarded as taking part in political strife, and a declaration was also published defining their policy of scrupulous impartiality and their attitude of strict fairness. The situation in China is now at the turning point and the awakening of the people is indeed worthy of note.

"When Czechoslovak troops had withdrawn from Trans-Baikalia the Japanese Government, consistent with their repeated declarations, withdrew their troops from that region. In districts around Vladivostok, whence menace to the peace of Korea was still felt and where the safety of many resident Japanese had to be provided for, and in Khabarovsk, which is the point of strategic importance on the way to the Province of Saghalien, we had to keep sufficient forces until such time as tranquillity was restored in these regions. As soon as the situation around Khabarovsk began to show a degree of stability we withdrew our troops from that district in September last.

"The political situation of Eastern Siberia underwent various vicissitudes during the course of the last half year. There were in existence since last spring four local governments at Vladivostok and other centers. The time gradually became ripe during last fall for amalgamation of these local

political bodies until in November last what is called the Amalgamation Assembly was held at Chita. This Assembly decided for the independence of the Eastern Republic. Chita was chosen for seat of central government and various political bodies were relegated to a position of local autonomy. It was also decided that the Constitutional Assembly should be held on the 25th of January.

"As a result of this amalgamation, the Provisional Government of Vladivostok turned its authority over to the Central Government about the middle of last December. The government of the Far Eastern Republic claims to stand for anti-Communistic democracy and has declared itself in favor of friendly relationship with foreign countries, especially with its near neighbors. What the new government may do in practice is for the future to reveal.

"The political stability of Russia in general is earnestly hoped for by Japan as her good neighbor, while as for Siberia in particular it is the keenest desire of the Japanese Government that this troubled area should be unified on a sound basis and be restored to complete order."—*N. Y. Times*, Jan. 25, 1921.

MEXICO

OIL SOLUTION SOUGHT.—On January 12 another protest was sent by the American State Department to Mexico regarding patents to Mexicans issued by the Mexican Government covering oil rights to parcels of land owned by American interests. Several such patents were issued in the closing days of President de la Huerta's régime.

On February 7, President Obregon appeared in person before a special session of the Mexican Congress. In his message he requested immediate solution of the oil question, which had "assumed an international character of grave aspect," and declared that the solution should if possible be such that "both the government and the oil men may be satisfied."

REVIEW OF BOOKS

"L'Escadre Allemande du Pacifique." By Paul Ardoin, Enseigne de Vaisseau de Reserve. (Published by Augustin Challamel, 17 Rue Jacob, Paris, France.)

This book was written while the author was in a German prison camp. Consequently, he had access to various German accounts of the cruise of Von Spee's Pacific squadron.

The publishers explain in a foreword that the author's death prevented them from calling his attention to certain passages that might be considered as reflecting adversely on the work of the Allied navies. Consequently, they published the book as originally written, explaining the fact that it was derived from German sources.

However, it is difficult to consider the book in any way as a eulogy of the German Navy. Rather it appears to be a very fair-minded and well-written history of the career of Von Spee's squadron in the Pacific, concluding with the final destruction of the vessels at the Battle of the Falkland Islands. True, tribute is paid to Von Spee's character, as well as to that of Von Muller, the captain of the *Emden*. Still I believe it is universally admitted that these men were worthy adversaries and brave seamen.

The narrative begins with the description of the vessels stripping ship in the Caroline Islands immediately after the declaration of war between Austria and Serbia. Shortly after this Von Spee learned that Germany had declared war against France and Russia. The admiral and his captains fervently hoped at this time that England would not engage in hostilities, for it was not difficult for them to forsee that England's entry into the war could not but result in the loss of all of Germany's colonies, thus depriving the squadron of any base.

Soon after it was learned that England had declared war, Von Muller, captain of the *Emden,* recommended that the squadron disperse and individually attack enemy commerce in different areas. Von Spee did not follow this suggestion altogether, but he did detach the *Emden,* and that vessel set out on her venturesome career.

From the Carolines the rest of the squadron proceeded to the Marshall Islands where the news was received that Japan had also declared war. This made the admiral's position all the more desperate, rendering as it did the return to an Asiatic base very precarious. The admiral then sent the *Nuremburg* to Honolulu for supplies and information; and shortly after that vessel left Honolulu, occurred the very dramatic incident of the destruction of the cable station at Fanning Island.

The Allies, finding it impossible for the time being to locate Von Spee's squadron and bring it to action, captured the German colonies, one by one.

Von Spee proceeded to the Society Islands where it seems almost incredible to realize that the governor did not recognize the ships as German, before delivery of supplies had actually been made.

The book continues with a very interesting account of the successful defense of Tahiti by a young French lieutenant, resulting in Von Spee's decision to refrain from attempting to land.

Early in October the admiral learned that Sir Christopher Craddock's squadron had been sighted at Punta Arenas. Von Spee proceeded to the Easter Islands, where he found that the governor did not know that a state of war existed between Germany and the Allies. Consequently, once again supplies were obtained without trouble.

After leaving the Easter Islands, a radio was received from a German agent in Chile to the effect that one of Craddock's ships, the *Glasgow*, had coaled at Coronel. Shortly afterwards Von Spee sighted the enemy off the Chilean coast and cleared for action. The engagement lasted only 54 minutes. The German forces were superior and they had the tremendous advantage of the weather gage. The *Good Hope*, Craddock's flagship, was sunk and the subsequent destruction of the *Monmouth* by the *Nuremburg* is graphically related.

Then follows an account of the enthusiastic welcome given the squadron by the German colony at Valparaiso. Yet even amidst this cheer, Von Spee realized that his squadron could not long survive with Germany shorn of her colonies. Of course, however, he scornfully rejected the suggestion that he should intern at Valparaiso.

Foreseeing difficulty in obtaining supplies in the future, the admiral decided to leave the Pacific. With the idea of obtaining stores at Port Stanley, the capital of the Falkland Islands, he put in there to encounter to his great surprise Admiral Sturdee with his battle cruisers. Sturdee's success in bringing his ships across the ocean unknown to the German Intelligence Department was, of course, one of the most brilliant feats of the war.

The author quotes Sturdee's official report of the Battle of the Falkland Islands, calling attention to the fact that this sea fight resembled a series of individual ship engagements rather than a concerted fleet action. The Battle of the Falkland Islands falls naturally into three phases, namely: the action against the German armored cruisers, the action against the light cruisers and finally against the transports. Of all of Von Spee's ships the *Dresden* escaped, only to meet destruction later in the channel where she had sought refuge. The final pages of the book describe the end of the *Dresden* and the interning of the *Prinz Eitel Friederich* at Norfolk.

The author's style is easy; the narrative is interesting, and the book is especially recommended for the officer who desires to improve his knowledge of French and at the same time review this phase of naval history.

N. R. V. X. V..

"Our Air Force—The Keystone of National Defense." By William Mitchell, Brigadier General, Air Service. (Published by E. P. Dutton Company.)

This volume, written by an officer who has had wide experience in aviation, is of particular interest, as it deals with a subject of supreme importance at the present time. In his discussion of the work of Army Aviation during the World's War, the author is at his best. He brings out clearly not only the usefulness of aviation as a military arm, but also the importance of the coordination of this arm with the other agencies utilized in war for applying military force. General Mitchell points out plainly the necessity for the development of civil aviation as a vital factor in national defense, also the importance of furthering the advance of aeronautics through the creation of airdromes, an improved meteorological service, and the upbuilding of an industry for the construction of aviation apparatus.

There is much in the book, however, which may be objected to by one who reads carefully and who would take issue with the cheerful, optimistic, imaginative enthusiast who has done a great deal to promote the activities of American aviation. The sailor first may be inclined to take exception to strategy as it is touched upon in places, where it appears that the defense of homeland against attack or invasion is dwelt on particularly, and the fact that adequate defense of a country comprises not only the defense of territory but the furtherance of the foreign policies of the government, which implies an ability at times to apply force from positions far beyond local frontiers. With these matters the navy always has been particularly concerned, and it can hardly be expected that one who has not had experience in naval affairs can treat these subjects in accordance with the naval idea.

His description of the employment of heavier-than-air machines and of personal experiences are of great interest, but the reader of historical narratives dealing with the war will take issue with the general in his discussion of lighter-than-air ships. The author's conclusions concerning the reliability and the employment of Zeppelins during the World's War and of their future usefulness are not at all in accord with the statements of Admiral Von Scheer, who remarks that

"Probably no arm of any service has suffered such severe losses as our airships, with the exception of the U-boats. Out of 61 Zeppelins which were assigned to the Fleet in the course of the war, 17, with their whole crews, were destroyed by the enemy. . . . .

"Twenty-eight airships were lost through stranding and other accidents, such as the burning of sheds in consequence of explosion. The crews of these were all saved, though in six instances they were made prisoner. Six ships had to be placed out of service as being useless; at the end, ten were still left in a condition fit for use.

* * *

"Their main task was scouting. That is why they were retained during the war as a weapon by the navy; the army had no use for them. The

development of the aeroplane produced a keen competitor and a dangerous opponent. The Flying Service could not, at first, overcome the difficulty of covering the great distances which scouting at sea entailed. It was a question of flying over large sea areas, such as the North Sea, and providing the fleet with trustworthy information and reports. Flights of 24 hours and longer had to be reckoned with, and no flying man could hold out for so long.

* * *

"Another very painful setback for navigation by airships occurred in January, 1918, when, owing to the spontaneous combustion of one of the airships in Ahlhorn, the fire spread by explosion to the remaining sheds, so that four Zeppelins and one Schütt-Lanz machine were destroyed. All the sheds, too, with one exception, were rendered useless."

Von Scheer sees great possibilities for the commercial airship, but considers that its usefulness in the future as a military machine is slight.

In the discussion of overseas aviation, there are numerous details with which the sailor will not agree. General Mitchell remarks that scouting over the water is easy as compared to over-the-land work of this kind. He refers presumably to the operation of seeing only, but visibility such as that with which he deals is not oftentimes encountered overseas in Northern latitudes. There are numerous other details in connection with scouting which are of interest and which cannot be neglected, notably that of knowing one's own position, that of the enemy when once he is discovered, and the position of one's supporting forces. In this detail, the operator on land usually may fare far better than can the sailor.

The author speaks of the possibility of dispelling fog, which is something for which the sailor has ardently hoped for centuries.

In dealing with naval operations of the future, the author passes lightly over many difficulties which have been sources of concern to the navies of the world for years. His unfamiliarity with the naval problem and naval weapons is evident. One is never inclined to take issue with a progressive prophet, but the thought is ventured, however, that it will be some time before naval vessels begin to battle with guns at ranges of 40,000 to 60,000 yards, as implied by the author, and the speed of 40 knots proposed by General Mitchell for huge carriers, however possible, is a gait yet to be attained by a large sea-borne craft.

Details to which naval men will object are the deductions made by the general as to the usefulness of aviation at the Battle of Jutland. His statement that "In the Battle of Jutland, German airships practically saved the German fleet" is not supported by Admiral Von Scheer, the German Commander-in-Chief, who indicates that, while it had been planned that the German Fleet should be well covered by aircraft in making the sortie which terminated in the battle, such was not the case because of an unfavorable weather condition "which was quite unsuitable for airships." In the operations preceding and leading up to the battle, German aviation accomplished nothing. On June 1, 1916, the day after the battle, the five airships that had gone out during the night endeavored to scout, but conditions continued to be unfavorable. One airship made contact, but was

compelled to retire and lost "sight of the enemy in a thick atmosphere." At 8.00 a. m. this vessel was dismissed by the commander-in-chief and returned to Nordholz at 2.00 p. m. One other airship, the *L-24*, sighted certain destroyers but found it "impossible to keep in contact for further reconnaissance as there was a bank of cloud as low down as 800 meters." It is difficult to understand how a military man could err so greatly in his historical references as has been done by the author in this instance.

On page 191 of his book, the general states "it is maintained by competent naval authorities that one airship saves two battle cruisers to a fleet. A battle cruiser to-day costs about $45,000,000 completely equipped." Admiral Jellicoe reported that under favorable conditions an airship was the equivalent of two *light* cruisers, but the bald statement of the general cannot be confirmed.

The possibility of using the great rigid as a transport for troops and for supplies, as proposed by General Mitchell, is of interest. It remains for the future to disclose the feasibility of so doing.

In dealing with naval weapons and their employment, the author makes statements which are not clear and which the sailor cannot readily understand; for example, on page 170, in discussing the torpedo, he writes as follows:

"Their specific gravity is almost the same as that of water so that if they are launched from any height they immediately sink."

This reason for failure is not evident to those who have concerned themselves for years with the development and the operation of the complicated mechanism of the torpedo. Perhaps because of his unfamiliarity with its possibilities, General Mitchell is inclined to slight the usefulness of the torpedo as a weapon.

There are many other details in which the sailor, or the sailor aviator, will not agree with the conclusions reached by the author, but on the whole the book is of interest as an optimistic treatise on the possible and probable useful development of the most recent and wonderful arm which science has placed at our disposal, the application of which is now to be worked out in connection with that of other military and naval branches.

T. T. C.

"Simsadus." By John Langdon Leighton, formerly Ensign, U. S. N. R. F. 170 pp. Published by Henry Holt and Company, with about 55 charts and illustrations. Price $4.00.

A very interesting and instructive account of the operations of the U. S. Naval Forces in Europe, the cable address of the headquarters of which the author takes as his title. Service on the staff of Admiral Sims in London, on the *Leviathan* and in the Brest "Suicide Squadron" of converted yachts gave the author unusual opportunity of observation and of obtaining valuable data. He covers all phases of our participation in the war, and the activities of vessels from sub. chaser to dreadnought, both in explanation of the method of operation and in interesting details of individual ship action against the enemy.

The book begins with the situation in April, 1917, when this country entered the war and Admiral Sims' arrival in London, then deals with the establishment of bases and the gradual amplification of our forces and the effect upon the submarine campaign of our greater efforts. The chapters on "Submarine Operations" and "The Destruction of Submarines" are particularly good. The reason given for Germany's failure to sink transports is unique, though his facts seem to prove his theory. The last chapter is an appreciation of Admiral Sims.

An appendix contains interesting tables showing the numbers of submarines sunk and where sunk, also the names of the captains. The book is of interest even to those who were intimately connected with the operations in Europe and to whom much of the information given is already known.

B. C. A.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It is now in its forty-eighth year of existence. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers upon subjects of interest to the naval profession, as well as by personal support.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy, subsequent to joining the Institute, will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control. To be declared elected, they must receive the affirmative vote of three-quarters of the members represented at regular or stated meetings, either in person or by proxy.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control. The Board of Control will at each regular meeting ballot on the nominations submitted for election, and nominees receiving a majority of the votes of the board membership shall be considered elected to membership in the United States Naval Institute."

Sec. 8. The annual dues for regular and associate members shall be three dollars, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be forty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

Sec. 10. Members in arrears more than three years may, at the discretion of the Board of Control, be dropped for non-payment of dues. Membership continues until a member has been dismissed, dropped, or his resignation in writing has been received.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published monthly. Subscription for non-members, $3.50; enlisted men, U. S. Navy, $3.00. Single copies, by purchase, 50 cents.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ARTICLE, 1922

A prize of two hundred dollars, with a gold medal and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best original article on any subject pertaining to the naval profession published in the PROCEEDINGS during the current year. The prize will be in addition to the author's compensation paid upon publication of the article.

On the opposite page are given suggested topics. Articles are not limited to these topics and no additional weight will be given an article in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. All original articles published in the PROCEEDINGS during 1921 shall be eligible for consideration for the prize.

2. No article received after October 1 will be available for publication in 1921. Articles received subsequent to October 1, if accepted, will be published as soon as practicable thereafter.

3. If, in the opinion of the Board of Control, the best article published during 1921 is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention," or such other distinction as the Board may decide.

4. In case one or more articles receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

5. The method adopted by the Board of Control in selecting the Prize Essay is as follows:

(a) Prior to the January meeting of the Board of Control each member will submit to the Secretary and Treasurer a list of the articles published during the year which, in the opinion of that member, are worthy of consideration for prize. From this a summarized list will be prepared giving titles, names of authors, and number of original lists on which each article appeared.

(b) At the January meeting of the Board of Control this summary will, by discussion, be narrowed down to a second list of not more than ten articles.

(c) Prior to the February meeting of the Board of Control, each member will submit his choice of five articles from the list of ten. These will be summarized as before.

(d) At the February meeting of the Board of Control this final summary will be considered. The Board will then decide by vote which articles shall finally be considered for prize and shall then proceed to determine the relative order of merit.

6. It is requested that all articles be submitted typewritten and in duplicate; articles submitted written in longhand and in single copy will, however, receive equal consideration.

7. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

H. K. HEWITT,
Commander, U. S. N., Secretary and Treasurer.

TOPICS FOR ARTICLES

Suggested by Request of the Board of Control

"Rebuilding the Navy's Enlisted Personnel, and Reestablishing Its Morale and Spirit After the Serious Slump Caused by Too Rapid Demobilization and High Wages in Civil Life."
"The Human Element in the Administration of Discipline."
"A Demobilization Programme for the Future."
"The Mission of the Naval Academy in the Molding of Character."
"Health of Personnel in Relation to Morale."
"Physical Factors in Efficiency."
"The Naval Officer and the Civilian."
"Naval Bases, Their Location, Number and Equipment."
"Military Character."
"The Ability to Handle Men a Necessary Element in the Equipment of a Naval Officer."
"The Relation of Naval Communications to Naval Strategy."
"The Relation of Naval Communications to Naval Tactics."
"The Training of Communication Officers."
"The Organization of a Naval Communication Service."
"The Naval Policy of the United States."
"A Review of the Battle of Jutland with Lessons to be Learned Therefrom."
"Modification in the Design and Armament of Ships to Meet the New Conditions of Aerial and Subsurface Attack."
"Coordination of Surface, Subsurface and Aerial Craft in Naval Warfare."
"Our New Merchant Marine."
"Submarine Warfare, Its History and Possible Development."
"Escort and Defense of Oversea Military Expeditions."
"A Proposed Building Programme for the U. S. Navy, Including an Efficiency Air Service."
"Naval Organization from the Viewpoint of Liaison in Peace and War Between the Navy and the Nation."
"The Ship's Company—Its Training, Discipline and Contentment."
"The Principles of Leadership of Naval Personnel."
"Morale Building."
"The Value of Facility in Exposition—Verbal and Written—for Naval Officers."
"Discipline as Affected by the Human Relation."
"The Value of Pep."
"Navy Spirit—Its Value to the Service and to the Country."
"The Influence of the Term of Enlistment on the Efficiency of the Service."
"The Principles upon which Should be Founded the Freedom of Neutral Shipping on the High Seas."
"The Fighting Fleet of the Future."
"The Future of the Naval Officer's Profession."
"The Navy: Its Past, Present and Future."
"The Navy in Battle: Operations of Air, Surface and Underwater Craft."
"Shall I Remain in the Navy?"
"Psychology and Naval Efficiency."
"The Naval Policy of the United States in the Light of the Peace Treaty."
"Scope of Naval Industrial Activity and the Navy's Relation to Shore Industry."
"The Pacific Theater."
"Was Germany's Coast Impregnable?"
"Future Development of the Naval Shore Establishment."
"America as a Maritime Nation."
"Arguments for and against the Restriction of the Manufacture of Munitions to Government Owned Factories."
"The Present Rule of Neutrality regarding Contraband and Blockade—Is it Justifiable in Ethics or in Expediency?"
"The United States Navy and the League of Nations."
"Is a League of Nations *Navy* Desirable?"
"The Adaptability of Oil Engines to all Classes of War Vessels."
"The Place of Mines in Future Naval Warfare and the Rules under which Their Use Should be Allowed."
"The Use and Abuse of the Doctrine of Continuous Voyage."
"The Question of the Future Use of Submarines."

LIST OF PRIZE ESSAYS

"WHAT THE NAVY HAS BEEN THINKING ABOUT"

1879

Naval Education. Prize Essay, 1879. By Lieut. Commander A. D. Brown, U. S. N.

NAVAL EDUCATION. First Honorable Mention. By Lieut. Commander C. F. Goodrich, U. S. N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U. S. N.

1880

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U. S. N.

1881

The Type of (I) Armored Vessel, (II) Cruiser Best Suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U. S. N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U. S. N.

1882

Our Merchant Marine: The Causes of Its Decline and the Means to Be Taken for Its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. Kelley, U. S. N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U. S. N.

"SPERO MELIORA." Honorable Mention. By Lieut. Commander F. E. Chadwick, U. S. N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U. S. N.

1883

How May the Sphere of Usefulness of Naval Officers Be Extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U. S. N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U. S. N.

"CULIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U. S. N.

1884

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U. S. N.

1885

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U. S. N.

1886

What Changes in Organization and Drill Are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U. S. N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORTS FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U. S. N.

1887

The Naval Brigade: Its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins.

1888

Torpedoes. Prize Essay, 1888. By Lieut. Commander W. W. Reisinger, U. S. N.

1891

The Enlistment, Training and Organization of Crews for Our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U. S. N.

DISPOSITION AND EMPLOYMENT OF THE FLEET: SHIP AND SQUADRON DRILL. Honorable Mention, 1891. By Lieutenant R. C. Smith, U. S. N.

1892

Torpedo-boats: Their Organization and Conduct. Prize Essay, 1892. By Wm. Laird Clowes.

1894

The U. S. S. Vesuvius, with Special Reference to Her Pneumatic Battery. Prize Essay, 1894. By Lieut. Commander Seaton Schroeder, U. S. N.

NAVAL REFORM. Honorable Mention, 1894. By Passed Assistant Engineer F. M. Bennett, U. S. N.

1895

Tactical Problems in Naval Warfare. Prize Essay, 1895. By Lieut. Commander Richard Wainwright, U. S. N.

A SUMMARY OF THE SITUATION AND OUTLOOK IN EUROPE. An Introduction to the Study of Coming War. Honorable Mention, 1895. By Richmond Pearson Hobson, Assistant Naval Constructor, U. S. N.

SUGGESTIONS FOR INCREASING THE EFFICIENCY OF OUR NEW SHIPS. Honorable Mention, 1895. By Naval Constructor Wm. J. Baxter, U. S. N.

THE BATTLE OF THE YALU. Honorable Mention, 1895. By Ensign Frank Marble, U. S. N.

1896

The Tactics of Ships in the Line of Battle. Prize Essay, 1896. By Lieutenant A. P. Niblack, U. S. N.

THE ORGANIZATION, TRAINING AND DISCIPLINE OF THE NAVY PERSONNEL AS VIEWED FROM THE SHIP. Honorable Mention, 1896. By Lieutenant Wm. F. Fullam, U. S. N.

NAVAL APPRENTICES, INDUCEMENTS, ENLISTING AND TRAINING. The Seaman Branch of the Navy. Honorable Mention, 1896. By Ensign Ryland D. Tisdale, U. S. N.

THE COMPOSITION OF THE FLEET. Honorable Mention, 1896. By Lieutenant John M. Ellicott, U. S. N.

1897

Torpedo-boat Policy. Prize Essay, 1897. By Lieutenant R. C. Smith, U. S. N.

A PROPOSED UNIFORM COURSE OF INSTRUCTION FOR THE NAVAL MILITIA. Honorable Mention, 1897. By H. G. Dohrman, Associate Member, U. S. N. I.

TORPEDOES IN EXERCISE AND BATTLE. Honorable Mention, 1897. By Lieutenant J. M. Ellicott, U. S. N.

1898

Esprit de Corps: A Tract for the Times. Prize Essay, 1898. By Captain Caspar Frederick Goodrich, U. S. N.

OUR NAVAL POWER. Honorable Mention, 1898. By Lieut. Commander Richard Wainwright, U. S. N.

TARGET PRACTICE AND THE TRAINING OF GUN CAPTAINS. Honorable Mention, 1898. By Ensign R. H. Jackson, U. S. N.

1900

Torpedo Craft: Types and Employment. Prize Essay, 1900. By Lieutenant R. H. Jackson, U. S. N.

THE AUTOMOBILE TORPEDO AND ITS USES. Honorable Mention, 1900. By Lieutenant L. H. Chandler, U. S. N.

1901

Naval Administration and Organization. Prize Essay, 1901. By Lieutenant John Hood, U. S. N.

1903

Gunnery in Our Navy. The Causes of Its Inferiority and Their Remedies. Prize Essay, 1903. By Professor Philip R. Alger, U. S. N.

A NAVAL TRAINING POLICY AND SYSTEM. Honorable Mention, 1903. By Lieutenant James H. Reid, U. S. N.

SYSTEMATIC TRAINING OF THE ENLISTED PERSONNEL OF THE NAVY. Honorable Mention, 1903. By Lieutenant C. L. Hussey, U. S. N.

OUR TORPEDO-BOAT FLOTILLA. The Training Needed to Insure Its Efficiency. Honorable Mention, 1903. By Lieutenant E. L. Beach, U. S. N.

1904

The Fleet and Its Personnel. Prize Essay, 1904. By Lieutenant S. P. Fullinwider, U. S. N.

A PLEA FOR A HIGHER PHYSICAL, MORAL AND INTELLECTUAL STANDARD OF THE PERSONNEL FOR THE NAVY. Honorable Mention, 1904. By Medical Inspector Howard E. Ames, U. S. N.

1905

American Naval Policy. Prize Essay, 1905. By Commander Bradley A. Fiske, U. S. N.

THE DEPARTMENT OF THE NAVY. Honorable Mention, 1905. By Rear Admiral Stephen B. Luce. U. S. N.

1906

Promotion by Selection. Prize Essay, 1906. By Commander Hawley O. Rittenhouse, U. S. N.

THE ELEMENTS OF FLEET TACTICS. First Honorable Mention, 1906. By Lieut. Commander A. P. Niblack, U. S. N.

GLEANINGS FROM THE SEA OF JAPAN. Second Honorable Mention, 1906. By Captain Seaton Schroeder, U. S. N.

THE PURCHASE SYSTEM OF THE NAVY. Third Honorable Mention, 1906. By Pay Inspector J. A. Mudd, U. S. N.

1907

Storekeeping at the Navy Yards. Prize Essay, 1907. By Pay Inspector John A. Mudd, U. S. N.

BATTLE REHEARSALS. A Few Thoughts on Our Next Step in Fleet-Gunnery. First Honorable Mention, 1907. By Lieut. Commander Yates Stirling, U. S. N.

THE NAVAL PROFESSION. Second Honorable Mention, 1907. By Commander Bradley A. Fiske, U. S. N.

1908

A Few Hints to the Study of Naval Tactics. Prize Essay, 1908. By Lieutenant W. S. Pye, U. S. N.

THE MONEY FOR THE NAVY. First Honorable Mention, 1908. By Pay Inspector John A. Mudd, U. S. N.

THE NATION'S DEFENCE—THE OFFENSIVE FLEET. How Shall We Prepare It for Battle? Second Honorable Mention, 1908. By Lieut. Commander Yates Stirling, U. S. N.

1909

Some Ideas about Organization on Board Ship. Prize Essay, 1909. By Lieutenant Ernest J. King, U. S. N.

THE NAVY AND COAST DEFENCE. Honorable Mention, 1909. By Commodore W. H. Beehler, U. S. N.

THE REORGANIZATION OF THE NAVAL ESTABLISHMENT. Honorable Mention, 1909. By Pay Inspector J. A. Mudd, U. S. N.

A PLEA FOR PHYSICAL TRAINING IN THE NAVY. Honorable Mention, 1909. By Commander A. P. Niblack, U. S. N.

1910

The Merchant Marine and the Navy. Prize Essay, 1910. By Naval Constructor T. G. Roberts, U. S. N.

THE NAVAL STRATEGY OF THE RUSSO-JAPANESE WAR. Honorable Mention, 1910. By Lieutenant Lyman A. Cotton, U. S. N.

1911

Navy Yard Economy. Prize Essay, 1911. By Paymaster Charles Conard, U. S. N.

NAVAL POWER. Honorable Mention, 1911. By Captain Bradley A. Fiske, U. S. N.

WANTED—FIRST AID. Honorable Mention, 1911. By Commander C. C. Marsh, U. S. N.

1912

Naval Might. Prize Essay, 1912. By Lieutenant Ridgely Hunt, U. S. N. (retired).

INSPECTION DUTY AT THE NAVY YARDS. Honorable Mention, 1912. By Lieut. Commander T. D. Parker, U. S. N.

1913

The Greatest Need of the Atlantic Fleet. Prize Essay, 1913. By Lieut. Commander Harry E. Yarnell, U. S. N.

NAVY DEPARTMENT ORGANIZATION. A study of Principles. First Honorable Mention, 1913. By Commander Yates Stirling, Jr., U. S. N.

TRAINED INITIATIVE AND UNITY OF ACTION. Second Honorable Mention, 1913. By Lieut. Commander Dudley W. Knox, U. S. N.

1914

The Great Lesson from Nelson for To-day. Prize Essay, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

NAVAL POLICY AS IT RELATES TO THE SHORE ESTABLISHMENT AND THE MAINTENANCE OF THE FLEET. Honorable Mention, 1914. By Captain John Hood, U. S. N.

OLD PRINCIPLES AND MODERN APPLICATIONS. Honorable Mention, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

MILITARY PREPAREDNESS. Honorable Mention, 1914. By Naval Constructor Richard D. Gatewood, U. S. N.

1915

The Rôle of Doctrine in Naval Warfare. Prize Essay, 1915. By Lieut. Commander Dudley W. Knox, U. S. N.

AN AIR FLEET: OUR PRESSING NAVAL WANT. First Honorable Mention, 1915. By Lieut. Commander Thomas Drayton Parker, U. S. N.

TACTICS. Second Honorable Mention, 1915. By Ensign H. H. Frost, U. S. N.

DEFENCE AGAINST SURPRISE TORPEDO ATTACK. Third Honorable Mention, 1915. By Ensign R. T. Merrill, 2d, U. S. N.

1916

The Moral Factor in War. Prize Essay, 1916. By Lieutenant (J. G.) H. H. Frost, U. S. N.

NAVAL PERSONNEL. First Honorable Mention, 1916. By Lieut. Commander J. K. Taussig, U. S. N.

EDUCATION AT THE U. S. NAVAL ACADEMY. Second Honorable Mention, 1916. By Lieutenant Ridgely Hunt, U. S. N.

SOME UNDERLYING PRINCIPLES OF MORALE. Third Honorable Mention, 1916. By Commander Dudley W. Knox, U. S. N.

LARGE *vs.* A GREATER NUMBER OF SMALLER BATTLESHIPS. Lippincott Prize Essay. By Lieut. Commander Thomas Lee Johnson, U. S. N.

1917

Commerce Destroying in War. Prize Essay, 1917. By Commander Lyman A. Cotten, U. S. Navy.

THE PEOPLE'S RÔLE IN WAR. First Honorable Mention, 1917. By Lieutenant H. H. Frost, U. S. Navy.

THE NATION'S GREATEST NEED. Second Honorable Mention, 1917. By Colonel Dion Williams, U. S. Marine Corps.

1918

Letters on Naval Tactics. Prize Essay, 1918. By Lieutenant H. H. Frost, U. S. N.

THE PREPAREDNESS OF THE FUTURE. First Honorable Mention, 1918. By Commander H. O. Rittenhouse, U. S. N. Retired.

NAVAL STRATEGY. Second Honorable Mention, 1918. By Rear Admiral Bradley A. Fiske, U. S. N.

1919

Military Character. First Honorable Mention, 1918. By Captain Reginald R. Belknap, U. S. N.

SOME REFLECTIONS ON THE THREE FACTORS OF BATTLESHIP DESIGN. Second Honorable Mention, 1918. By Lieut. Commander Beirne S. Bullard, C. C., U. S. N.

1920

The Battleship. Prize Article, 1920. By Commander E. F. Eggert, C. C., U. S. N.

SOME IDEAS ABOUT THE EFFECT OF INCREASING THE SIZE OF BATTLESHIPS. First Honorable Mention, 1920. By Captain E. J. King, U. S. N.

U. S. C. N. Second Honorable Mention, 1920. By Lieut. Commander K. C. McIntosh, S. C., U. S. N.

1921

Accuracy of Fire at Long Ranges. Prize Article, 1921. By Captain J. V. Chase, U. S. N.

A DESCRIPTION OF THE BATTLE OF JUTLAND. Honorable Mention, 1921. By Lieut. Commander H. H. Frost, U. S. N.

POSSIBILITIES OF A TRANS-PACIFIC FLIGHT. Honorable Mention, 1921. By Commander G. C. Westervelt (C. C.), U. S. N., and H. B. Sanford.